EXAKTA 35mm GUIDE

EXAKTA I, II
EXAKTA VAREX V, VX
EXAKTA VAREX IIa, IIb
EXAKTA VX500, VX1000

EXAKTA RTL 1000
EXAKTA I, Ia, II, IIa, IIb
EXA 500

COMPLETE COMPACT CORRECT

THE CAMERA GUIDE

This is a *Camera Guide*. It deals with one make of camera, but it is not boosting it. The *Camera Guide* is a Focal Press publication. It is not sponsored or censored by manufacturers, or dependent on them in any way. The *Camera Guide* is as scrupulous in fully describing the camera and advising on its use as the very best type of manufacturer's book of instructions. It is, however, more critical than they could be. No *Camera Guide* will attempt to camouflage the limitations of a camera or make efforts to sell an endless chain of accessories. It is straightforward, practical and devoted to the questions of how to take the best photographs with a particular camera, rather than to praise of it. The *Camera Guide* is compiled by an author who has had long experience in handling the equipment in question. It represents at the same time the gist of all available literature collected by the *Focal Press Circle of Photographers* and filtered through their considered judgment.

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EXAKTA 35 mm. GUIDE

How to Use
The Exakta I, II,
Exakta Varex V, VX, IIa, IIb,
VX500, VX1000, RTL1000
Also the Exa I, Ia, II, IIa, IIb and 500

By W. D. EMANUEL

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THE 35 mm. EXAKTA MODELS

The 35 mm. Exakta is a single-lens reflex camera. The actual taking lens serves both for focusing and taking the picture and is used to form the image on the film as well as to reflect the picture to be taken on to a ground-glass focusing screen. Film and focusing screen are for all intents and purposes at the same distance from the lens, but in different positions and at right angles to each other. The film runs along the back of the camera while the focusing screen is on the top of it. Thus, the light entering through the lens has to go alternately in two directions: once to the focusing screen and once to the film. This two-way traffic is controlled by a mirror on point-duty. By setting the shutter, the mirror is introduced into the path of the light-rays between lens and film, thus reflecting the image on to the focusing screen, showing exactly the same outlines, definition, depth of field and relative brightness of the subject as will appear on the negative. The screen is a plano-convex lens ground on the underside, and shows the image magnified and brilliant all over. It is the right way up and permits critical focusing (aided by a built-in magnifier), as well as adjustment of the extent of definition towards both the foreground and background and, lastly, composition of the photograph before the negative is exposed. With the release of the shutter for exposure, the mirror first snaps upwards and covers the focusing screen. Then the shutter goes across and the image is recorded on the film.

The shutter of the Exakta is a *self-capping focal plane* shutter (except RTL1000, see page 10) travelling from right to left. "Self-capping" means that it remains closed while being wound up; "focal plane" means that it moves right in front of the negative material, thus ensuring full protection to it. With this type of shutter, lenses can be changed while the camera is loaded. The Exakta shutter has the widest possible range of speeds. Besides the instantaneous speeds from 1/30 (early 1/25) to 1/1000 sec., automatic time exposures from 1/8 (early 1/10) to 12 secs. can be set.

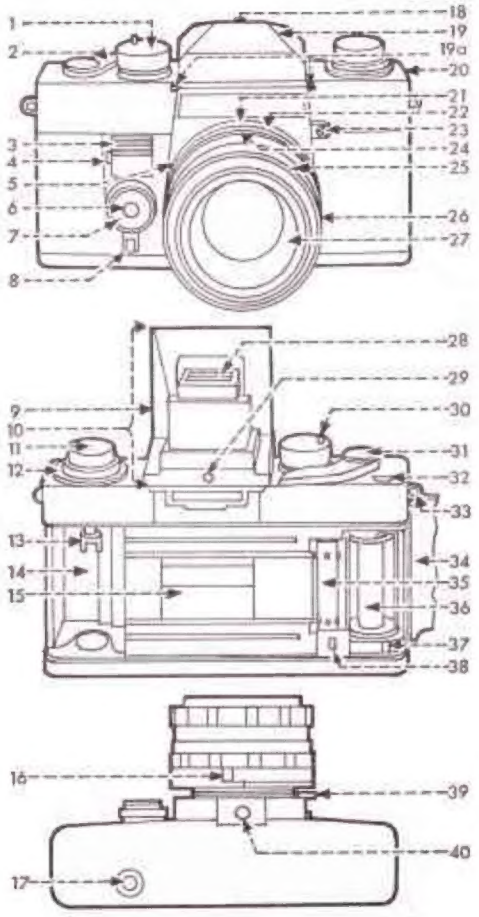
A delayed-action release (self-timer) is built-in and coupled to the shutter, allowing all speeds from 1/1000 to 6 secs. to be released with a delaying time of about 12 secs. This very wide choice of longer automatic shutter speeds is unique for miniature cameras and is useful for certain specialised work. On the other hand, this shutter is more complicated than those of most of the other miniature cameras and needs careful handling. Shutter winding is automatically coupled with film transport and the swing of the mirror into the focusing position.

Exakta lenses include the well-known Domiplan, Jena Tessar, Pancolar, Domiron, Orestegon as standard lenses, besides a wide range of more specialised lenses by other manufacturers. The lenses are *interchangeable*, allowing the use of telephoto, wide-angle and particularly fast lenses from 20 to 1000 mm. and apertures up to *f*1.8. One unique feature of the single-lens reflex type is that, whatever lens is used, *no special finders* are required, as the reflex finder shows in every case the correct image with the lens employed. The interchangeability of the lens permits the straightforward use of *extension tubes* for close-ups without the least complication of focusing. The same goes for using the camera in photomicrography, etc.

The reflex-finder hood permits normal reflex image viewing and focusing as well as eye-level viewing and focusing by means of a pentaprism in the Exakta V, VX, IIa, IIb, VX500, VX1000, RTL1000 and Exa I. It has a direct vision frame finder to be used for viewing only. A *magnifying glass* permits critical focusing.

The waist-level reflex finder is interchangeable in Exakta models V, VX, IIa, IIb, VX500, VX1000 and RTL1000—as well as on the Exa I—against an eye-level pentaprism reflex finder.

The body of the Exaktas (except RTL1000) is of trapezoid shape, approximately $6 \times 3\frac{3}{4} \times 3$ in. It is die-cast aluminium alloy in one piece with the negative aperture, leather-covered, and has a hinged back. It is comparatively small

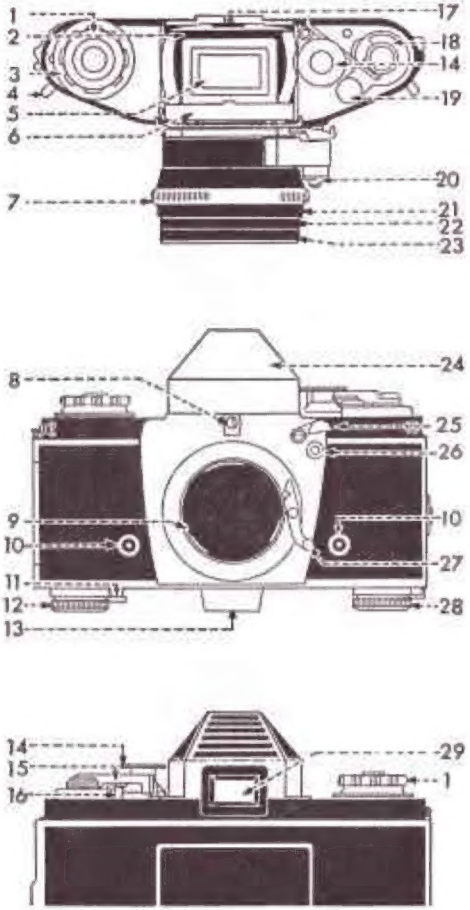


1, Shutter speed knob. 2, Rapid-wind lever. 3, Shutter release. 4, Release lock. 5, Depth of field preview. 6, Self-timer release. 7, Slow shutter speed knob. 8, Slow speed tensioning lever. 9, Finder hood cover. 10, Finder hood. 11, Rewind crank. 12, Film speed reminder. 13, Rewind arbor. 14, Cassette chamber. 15, Film aperture. 16, Auto-manual switch. 17, Rewind button. 18, Pentaprism eyepiece. 19, Pentaprism. 19a, Finder system lock. 20, Flash contact. 21, Lens change aligning mark. 22, Lens change aligning mark. 23, Shutter release. 24, Depth of field scale. 25, Distance scale. 26, Lens locking lever. 27, Lens. 28, Focusing magnifier. 29, Finder hood release catch. 30, TTL pentaprism coupling pin. 31, Film-type reminder. 32, Frame counter. 33, Carrying lug. 34, Camera back. 35, Film wind sprocket. 36, Take-up spool. 37, Film leader mark. 38, Film leader guide. 39, Lens locking lever. 40, Tripod bush.

Top: Front view of camera with pentaprism. Centre: Rear view of camera with focusing hood and opened back. Bottom: Bottom view of camera with standard lens attached.

EXAKTA 11A, 11B, VX500 AND VX1000 CONTROLS

1, Slow speed and delayed action knob. 2, Focusing screen. 3, Film indicator. 4, Carrying lug. 5, Magnifier. 6, Focusing hood. 7, Aperture ring. 8, Hood pentaprism catch (not on 11b). 9, Bayonet lens mount. 10, Flash sockets. 11, Film cutting knife. 12, Rewind knob (crank on 11b). 13, Tripod bush. 14, Shutter speed knob. 15, Rapid lever wind. 16, Rewind button. 17, Eyepiece in hood. 18, Film counter. 19, Counter setting. 20, Release for preselector iris. 21, Depth of field scale. 22, Distance scale. 23, Focusing mount. 24, Pentaprism. 25, Release cover. 26, Shutter release. 27, Lens catch. 28, Back lock. 29, Eyepiece in pentaprism finder.



Top: Top view of camera with focusing hood. *Centre:* Front view without lens, with pentaprism. *Bottom:* Rear view of upper part with pentaprism.

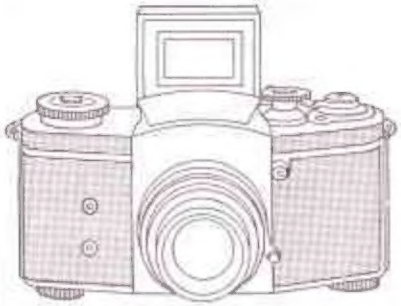
THE EXA MODELS

The Exa 1, introduced in 1963 (*below*), is basically the same as the models current up to 1961 (*right*). Its styling was improved, however, and the shutter speeds changed.

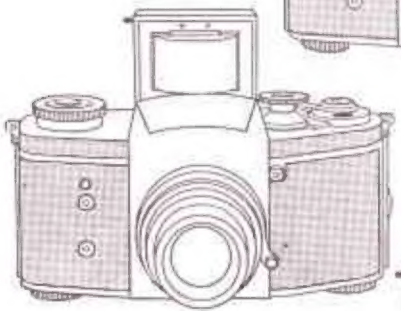
The 1964 Exa IIa (*left*) is similar to the Exa II (*above*), but has a detachable back and improved film transport. It can be supplied with standard ground glass screen or with a ground glass with fresnel screen and split-image rangefinder in the centre. The Exa IIb is as IIa, but with instant return mirror.

The 1967 Exa 500 (similar in appearance to the Exa IIa) is fitted with pentaprism and microprism rangefinder, extended shutter speed range and fully automatic diaphragm lens.

EARLIER 35 mm. EXAKTA MODELS



Right: Model I, the original Kine Exakta, has non-interchangeable focusing screen and is synchronised for bulbs only.



Left: Model II is similar to Model I, but has a different hood and film counter.

Right: Models V and VX have interchangeable screens and are M- and X-synchronized, having two sets of sockets. The 1956 model of the VX has a single concentric socket at each side.

in spite of housing the focal plane shutter, reflex arrangement and fast interchangeable lenses. It also has a tripod bush, internal flash synchronisation for electronic flash and flash bulbs and hooks for a neck-strap. The weight is approximately 33 oz. (950 grams).

Focusing is effected by a rapid helical focusing screw, which is part of the lens-mount. A focusing scale is found on all models indicating the distances from infinity down to 4 or 3 ft. There are also scales provided for reading off the depth of field.

The film is the standard 35 mm. miniature film for up to 36 exposures $1 \times 1\frac{1}{2}$ in. (24×36 mm.). A film cutting knife is built in (except RTL1000). In the latest model the film can be transported from cassette to cassette, making rewinding unnecessary, or to take-up spool with rewinding. A film type indicator and a film transport indicator complete the mechanism.

A *through-the-lens metering finder* (the Examat) has been marketed, made by Harwix, Berlin, which can be used with the Exakta or EXA 1. This unit combines a pentaprism viewfinder and exposure meter converting the camera into a TTL model (details on page 65). For the model RTL1000 a TTL prism attachment for automatic exposure system with internal metering is available, made byExakta (page 66).

Exakta Models

EXAKTA RTL1000 (1970). This model embodies all the refinements of the Exakta, but has been redesigned and incorporates significant advances in photographic technology. One of the three interchangeable viewfinder systems consists of a coupled TTL pentaprism for internal light measurement. It has a metal focal plane shutter from 8 sec. to 1/1000 sec. and B; the built-in delayed-action timer covers the speeds from 1 sec. to 1/1000 sec. Electronic flash is synchronised at 1/125 sec., bulbs at 1/30 sec. Shutter release on right and left-hand side. New range of lenses with internally controlled automatic apertures. The lenses of the earlier Exakta models can be used also for automatic aperture with an adapter on the release. It has self-setting frame counter, rewind pin remains depressed, rewind crank. The film cutting knife of the earlier models has been omitted.

EXAKTA VAREX IIa (1957). This model follows in general the above description. Its main differences compared with the earlier models are three co-axial flash sockets (X, M and F), a specially silent shutter mechanism and an improved film indicator. The 1961 model of the Varex IIa is fitted with an improved reflex hood (with one-finger closing) which also accepts the interchangeable ground-glass screens for special purposes, e.g. with split image rangefinder (up to now only available for the pentaprism). This hood has no direct vision frame finder. The standard lenses have fully automatic preset iris.

EXAKTA IIb (1964) is similar to the model IIa of 1961, but has geometrical speed scales (1/30, 1/60, 1/125, 1/250, 1/500, 1/1000 sec.). The rewind knob has a crank. The catch to secure the finder is not needed.

EXAKTA VX1000 (1967) is as the Exakta IIb, but with instan return mirror and minor mechanical improvements.

EXAKTA VAREX VX500 (1969) is a scaled-down version of the VX1000, with shutter speeds of 1/30 to 1/500 sec. and B only.

EXAKTA VAREX VX (1956) is similar to the model IIa, but has only two flash sockets.

EXAKTA VAREX VX (1951) has flash sockets for a two-pin flash plug instead of concentric sockets.

EXAKTA VAREX V (1950), the predecessor of the VX is similar to it except that it has no film type or transport indicators, it does not permit working from cassette to cassette and the back is not hinged.

EXAKTA II (1949) is as Exakta V but has no interchangeable reflex finder, so that the pentaprism attachment is not usable (but a special prismatic attachment can be placed on top of the reflex hood, see page 84). The flash contact is for flash bulbs only, and there is a minor change in the mechanical construction of the film transport.

EXAKTA I (1936), the original pre-war Kine Exakta, is similar to Exakta II with quite minor mechanical differences which do not affect its manipulation.

The Exakta cameras using 35 mm. film were originally called "Kine Exakta" to distinguish them from the roll film Exaktas then also produced. The prefix "Kine" was dropped in 1950, however.

Exa Models

The Exas are simplified versions of the Exakta. They retain many of its features, in particular the reflex focusing-viewing system and the interchangeable lens system. In addition to the lenses listed for the Exakta, an inexpensive standard lens, *f*2.9 50 mm. Meritar, 3 element with pre-set diaphragm, is available for the Exa models.

EXA II (1959) has shutter speeds from 1/2 to 1/250 sec. and B, single flash contact, but no delayed action. The eye-level pentaprism finder is permanently fitted. Most Exakta accessories, including all lenses, may be used in it.

EXA IIa (1963), similar to II, but has detachable back and improved film transport.

EXA IIb (1965), similar to IIa, but with instant return mirror (the image can be viewed before and after exposure), a warning signal in the viewfinder when the film has not been advanced, and general mechanical improvements.

EXA 500 (1967) is an improved version of the Exa IIb with fully automatic diaphragm lens, pentaprism with fresnel screen and micro-prism rangefinder, shutter speeds 1/2 sec. and 1/500 sec. and B, and XM flash synchronization.

EXA I (1953) has a shutter of different design with speeds of 1/25, 1/50, 1/100, 1/150 sec. and B only, two flash contacts, no delayed action. Film wind is by a transport knob; the film cutting device is omitted. Long focus lenses beyond 100 mm. are not usable (without undue cut-off) and similarly close-ups with longer extension tubes than 2 in. (5 cm.) cannot be made.

EXA I (1961), as I 1953 with improved reflex hood.

EXA I (1963) has improved styling, shutter speeds 1/30, 1/60, 1/125 1/175 sec., B, single flash contact with symbol setting for electronic flash and bulbs.

EXA Ia (1965), similar to EXA I (1963), but with lever film transport.

In handling, the Exa cameras are substantially the same as the Exakta. Where differences occur which are not self-evident, these are pointed out in the text.

HANDLING THE EXAKTA

To start with, we take it for granted that we have our Exakta, together with a cassette of film, in front of us. Our first task is to load the camera with film.

Loading

The film should be loaded into the camera in subdued daylight, or at least in the shadow of your body. The procedure is as follows:

1. **Open camera-back.**
2. **Insert film.**
3. **Fix film on take-up spool.**
4. **Close camera.**
5. **Open finder hood.**
6. **Transport film twice and release.**
7. **Wind film-winder once more and set picture-counter.**
8. **Set film indicator.**

1. **Open camera back** by pulling downwards and turning the milled camera opening knob on the camera base. On earlier models and some Exa models, press camera back lock. On RTL1000, pull up the rewind knob as far as it will go.
2. **The rewind key** is pulled out as far as it will go, then place loaded film cassette into right-hand side film chamber (below slow speed and delayed action knob) with its hollow part towards rewind key. The mouth of the cassette with the film end has to point towards the take-up spool. The rewind knob is now fully pushed back, taking care that its centre plate is *not* pushed upwards.

   The film chamber of the Exa has a cassette guide (a metal sheath which projects from the roller towards the chamber). The loaded cassette is inserted from beneath the camera, so that the mouth of the cassette lies against the edge of the guide.
3. **Hold the cassette in position** with the left thumb, while pulling with the right hand 4 to 4½ in. (10 to 11 cm.) film from it. The free end of the film is pushed under the spring tongue of the take-up spool of the camera (below the film winder). The take-up spool can be turned on its axis to bring the spring tongue into the most convenient position for inserting the film. While fixing the film under the tongue the spool should be prevented from turning by

holding it still with one finger. Before closing the camera back, make sure that the perforations of the film engage in the teeth of the film transport sprockets.

On RTL1000, pull the beginning of the film to the green mark and push it with its lower perforation from above under the film rest and over the film transport sprocket. The wire frame on the take-up spool must *not* point upwards (but in any other position).

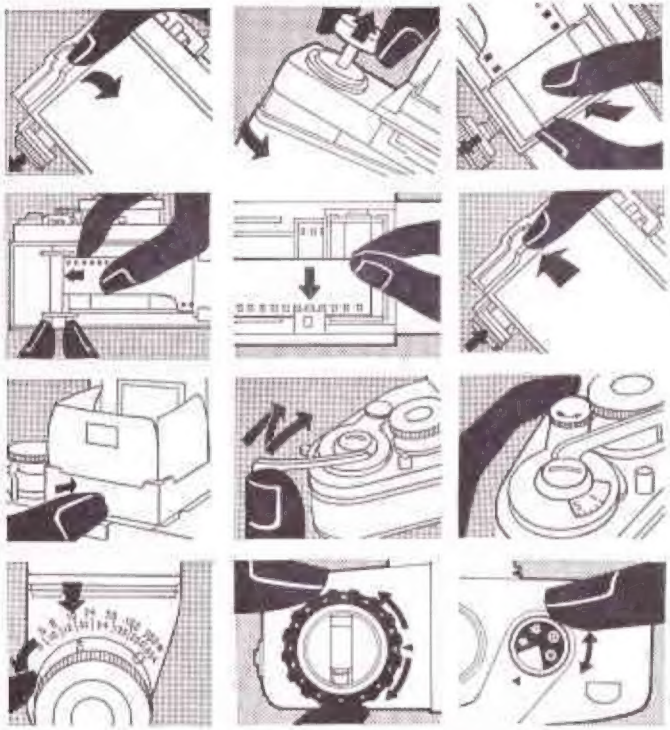
On the Exa I (1961) camera, remove the take-up spool from its chamber and push the film end under the spring of the take-up spool. The film is wound on to the take-up spool with the emulsion side *outwards* except on Exa I (1963) and later, where it winds inwards. Now insert the take-up spool into its chamber, ensuring that its top engages in the shaft of the film transport knob, and the perforation of the film in the film transport sprockets.

When working with two cassettes with the Exakta VX, IIa, b, VX500 and VX1000, trim the free film end square. Open the take-up cassette (page 37), remove any cut-off film end from the centre spool and attach the end of the fresh film to the centre spool of the take-up cassette (No. 4, page 37). Assemble the take-up cassette, and insert it in the take-up chamber. The slit of the take-up cassette must point towards the film aperture of the camera. Make sure that the perforations of the film engage in the teeth of the film transport sprockets, and close the camera back.

To work from cassette to cassette on Exa I (1961) cameras, simply replace the take-up spool by an empty cassette and adopt otherwise the same loading procedure as described for use of the take-up spool.

4. **Close the camera back.** With the Kine Exakta I and II, *take care that the circular peg inside the camera connected to the rewind key is pushed firmly into the interior of the camera.* This is best done with the ball of the left thumb. The camera back, held in the right hand with its locking-key upwards, is hooked with its lower end into the groove on the body of the camera, and the back itself pressed lightly towards the body until the locking-key snaps into position. The rewind key must be allowed to catch in the camera back so that it is clamped to the camera and cannot be pulled out when the back is closed.

   On RTL1000 just press back gently home; it will lock automatically. Transport and release the film transport lever and repeat until the automatic frame counter points to No. 1. Ignore the points 5, 6, 7 below.
5. **The finder-hood springs** open by pressing its catch in the middle of the back base of the hood.
6. Wind and release the film transport twice with the shutter set to any speed except T (–Z). This action implies that the film has been moved forward the first two frames, which have been exposed to light while inserting the film into the camera. These two wasted leader-frames do *not* count as part of the 36 exposures.



Top row: Open camera back (on RTL 1000, pull up rewind knob fully) and insert film cassette.
Second row: Attach leader to take-up spool (on RTL 1000, lay leader across spool after passing under film guide). Close camera back.
Third row: Open finder hood, where applicable. Make two 'blind' exposures. Wind on again and set film counter (except on RTL 1000).
Bottom row: Set film speed indicator on earlier models (*left*), on RTL 1000 (*centre*). Set film type indicator.

7. **The third film-wind** brings the *first* unexposed piece of film into position, at the same time pulling the film tight. After winding on, the exposure counting disc is set to No. 1 by moving its setting knob (in earlier models the disc itself) in the direction of the engraved arrow until No. 1 points to the picture counting mark (small black triangle). *On no account must the counting disc be turned backwards* (against the arrow), as the subsequent exposure numbers would not be indicated correctly.

   The Exa I (1961) film counter is a segment cut out in the top of the camera beside the film transport knob. Turn the knob in front of the segment (while pressing the top of one finger against it) in the direction of the arrow until No. 1 points to the index mark of the segment. On the subtractive counter of Exa I (1963) and Exa 500, set to 36 or 20 respectively.

   On the Exakta VX, IIa, b, VX500 and VX1000 the film control disc, seen in the circular cut-out on the outside of the slow-speed knob, will rotate when the film is being transported.

8. **The film indicator** around the base of the slow-speed knob of the Exakta VX and IIa, b (on VX500, 1000 in its centre, on RTL1000 on the base of the transport lever) should be set in accordance with the speed of film loaded into the camera as a reminder. Early models have instead a film type indicator with the symbols S = black-and-white; black C = colour, daylight type; red C = colour, artificial light type. The Exa 500 has both types of reminder.

Carrying

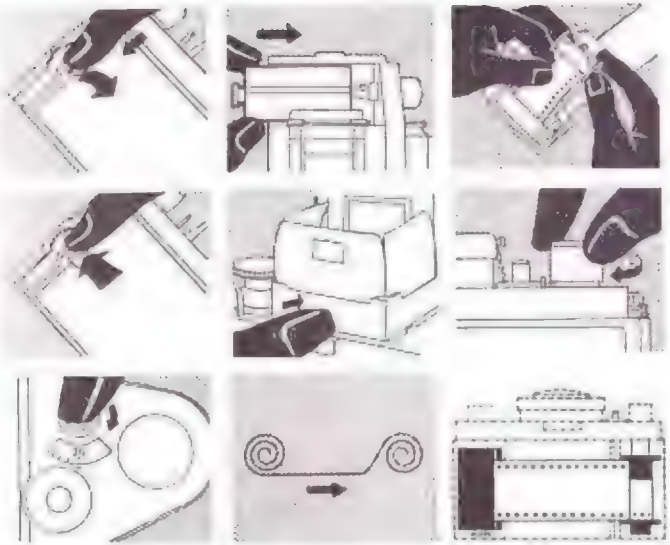
However elegant it may be to carry the camera on a long strap hanging from the shoulder, this position is quite unsuitable for quick action. Many a good shot has been lost in this way. A better method is to carry the Exakta on a short strap round the neck, so that it lies on one's chest—in the right position ready for work. Opening the case and finder hood or, when working with the pentaprism lifting the camera up to eye level, is then a matter of a split-second.

There are a number of different types of cases available for the Exaktas:

The ever-ready case carries the Exakta ready for use, and there is a holding screw which prevents the camera from falling out of the opened case.

Outfit cases in several variations are available to take the Exakta, together with auxiliary lenses, filters, films, etc. Also, separate cases for one lens or any of the other Exakta accessories are also on the market.

LOADING THE EXA



Top left: Open the camera back.

Top centre: Insert the film cassette.

Top right: Fix the film on the take-up spool.

Centre left: Close the camera back.

Centre: Open the finder hood (on Exa I only).

Centre right: Advance the film twice, pressing the release each time.

Bottom left: Set the film counter for the first exposure (slightly different on the two models).

Bottom centre: The path of the film inside the camera. It winds up emulsion side out on the take-up spool on the EXA I up to 1961, but emulsion side in on the EXA I (1963) and later.

Generally, it is of foremost importance *to acquire sufficient experience in manipulating all parts that eventually lead to taking the picture* by getting thoroughly acquainted with the ways in which to work them before actually setting out to make photographs. Surely one should try the gears, the accelerator, the brakes and even the horn of a new car before going "all out" with it. Going all out with a new camera without being able to do the "right thing" almost automatically is not less dangerous. It may be less wasteful of lives—but it is not less wasteful of live pictures, if not of the camera itself.

The following are the mechanical points that must be particularly watched when using the earlier Exakta: (1) *Opening and closing the finder hood.* (2) *Winding the film and setting the shutter.* (3) *Releasing.*

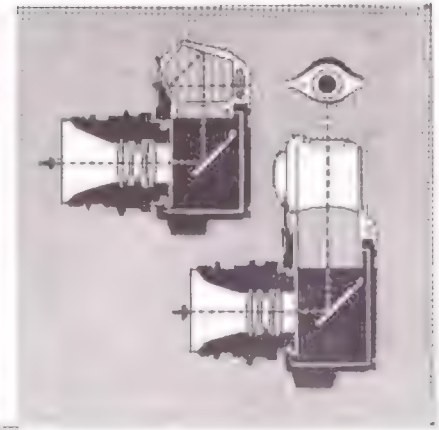
Viewing

The reflex finder and the eye-level pentaprism are viewing-focusing devices. The frame finder is purely a viewing device.

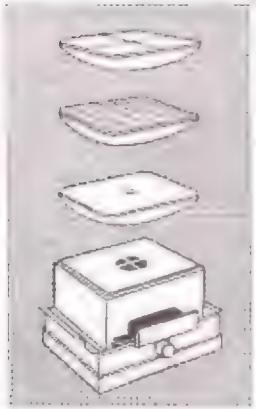
REFLEX FINDER. To bring the finder hood of the Exakta into the working position, the catch on the back of the finder hood has to be pressed down, when the hood automatically opens up, permitting observation of the ground-glass screen image up to the moment of exposure. The screen of the Exakta is actually one side of the plano-convex lens, the lower side of which is matted to form a ground-glass screen; the lens also acts as a powerful magnifier. Therefore, the reflex image seen in the finder hood is bigger than the actual image on the negative while—naturally—the outlines and definition remain identical. For more critical focusing a built-in magnifier may be employed in addition to the magnifying ground glass. The magnifier is erect in the front wall of the finder hood; to bring it into position, it is simply pressed inward towards the reflex image, where it will be automatically held by a catch. Looking down, the reflex image appears further enlarged, so that it may be focused with ease and accuracy. While the first edition of the 35 mm. Exakta was fitted with a circular magnifier, showing only a comparatively small circular central section of the field, the later models have a bigger, rectangular-shaped magnifier, allowing almost the whole field to be viewed. The magnifier is released from its horizontal position by pressing the small stud on the right-hand bottom corner of the back of the finder hood.

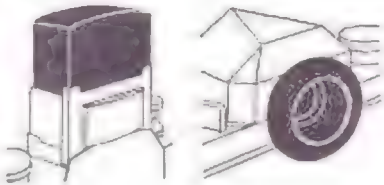
The magnifier has a protecting cover (except Exakta I) and shows the

Right: The standard reflex finder fitted to all models is used by looking down on the screen. With Models V, VX, IIa, IIb, VX and RTL 1000 as well as the Exa I and Ia, the viewing unit is interchangeable with a pentaprism type, which permits use at eye level. In the Exa II the eye-level finder is fixed.



Below: The normal ground screen of the pentaprism finder and also the reflex finder of the 1961 Exakta IIa and IIb may be readily interchanged with other types for special scientific purposes (see page 20).





An eye-level pentaprism attachment has been made for Model II and fits on top of the erected hood (*left*). An accessory for the pentaprism unit for Models V, VX, IIa, Ib, VX and RTL 1000 is an eyep ece to exclude stray light (right).

whole image, so that the camera can be used without lowering it after critical focusing.

The reflex finder image seen is the picture produced by the camera lens and reflected by the mirror on to the screen. The reflex image is only visible after the film has been wound on, and it disappears once the shutter is released. It has a twofold purpose: first to show the *outlines of the picture*, second to permit the best *definition* to be obtained.

The reflex finder of Exakta IIa (1961) and IIb accepts also the special condenser bases with split-image range finder, etc.

There should be no difficulty in getting the outlines as exact as required. It is advisable to *view the picture first with full-opened aperture* to ensure the brightest possible reflex-image. The finder hood extension (page 81), keeping stray light from the screen, gives additional brilliancy to the picture. In spite of the fact that one is likely automatically to hold the camera quite *level*, one should make sure that the vertical lines of the picture run parallel with the sides of the ground-glass frame, if intentional tilting is not aimed at.

The second purpose of the reflex finder, obtaining the best definition, is at the same time one of the most important factors ensuring good results. The less experienced user of the reflex screen is apt to accept, all too hastily, a seemingly sharp impression of the image as best definition. There are, however, different degrees of sharpness even at full aperture, which one should make use of in determining the best possible definition. The best way to arrive at critical definition is to *turn the helical focusing mount to and fro* while observing how the main object at which one intends to focus accurately becomes more and more sharp up to a certain point, beyond which it will again lose definition. It is at this "beyond" stage that we reverse the movement of the focusing mount. The degree of movement of the focusing mount is slowly narrowed down until one unmistakably arrives at the point of the very best definition. It is a case of "encirclement" *from the sharp surrounding to the critical sharp point*. It must be repeated that, before and beyond the point of maximum definition, the image still appears sufficiently sharp, but no one should be deceived by this fact: it is not good enough for enlarging.

The built-in magnifying glass swung into position will assist in determining the critical focus. Having found this, the magnifier should be folded back and the whole image on the screen surveyed before release. The camera, which had to be raised when using the magnifier, should now be lowered again. Otherwise—with the magnifier in front of us—we may get excellent definition, but are bound to lose sight of the picture as a whole.

The picture on the ground-glass screen appears *upright but reversed* left to right. Similarly, movements are also shown reversed and *the camera will have to be turned against the apparent movement of the object to follow it*.

PENTAPRISM FINDER. This is for the Exakta RTL 1000, VX500, 1000, IIa, b, VX, V and EXA I; it is interchangeable against the normal reflex finder and is an extremely valuable alternative focusing-viewing method. To change from the reflex to the eye-level finder, the finder housing is lifted up bodily and replaced by the other finder housing, while on EXAKTA VX1000, IIa, VX or V the sliding catch on the front plate is depressed.

With the pentaprism in position, the image is viewed and focused at eye level and seen upright and the right way round. The bright image makes accurate focusing easy, and changing from the horizontal to the vertical position is straightforward.

The base of the pentaprism finder consists of a plano-convex lens, the flat side of which is a ground screen. This base is interchangeable for special ones, with split-image rangefinders available either on a normal ground-glass screen or on an extra-bright fresnel lens screen giving uniform brightness edge to edge. They give split-image rangefinder focusing, in addition to normal screen focusing. Two small prisms are mounted in a clear spot in the centre of the screen, and the image in the spot appears disrupted, on turning the focusing ring, the two disrupted halves are brought into line so that one continuous image is seen, and in this position one has focused accurately.

For more specialised types of work, in particular for macrophotography and photomicrography, the ground-glass condenser may be changed for clear glass (to permit focusing on the more brilliant aerial image), or for ground-glass with a centre spot of 3 or 10 mm.

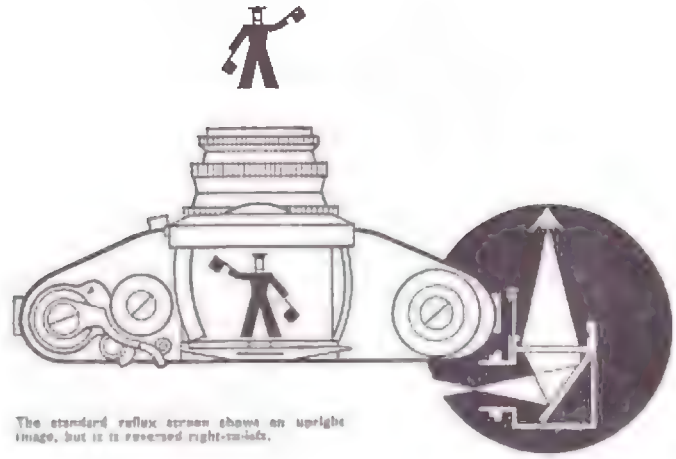
Prism finders combined with exposure meter are available: see page 65.

FRAME FINDER. The Exakta models prior to 1961 were fitted with a direct vision frame finder. This is brought into position by pressing inwards the magnifying glass in front of the finder hood. The rectangular aperture in the back wall of the finder hood, together with the open frame in the front wall, form a direct vision frame finder for eye level.

To use the frame finder of Exakta IIa, VX V, II, lift up the magnifier and also the protective cover. The frame when viewed through the sight will define the outlines of the picture aimed at. When using the frame finder, one must not attempt to turn the camera to the right or the left, away from the eye, nor must the eye be moved from the centre of the back frame to find the limitations of the field of view. This *spying "round the corner" is deceptive*, as only the section seen in the finder, when holding the eye close to and in the centre of the opening while looking straight ahead, will appear on the negative. The frame finder gives the correct field only for the standard 5 cm. lenses, and it cannot be expected to be free of parallax.

The frame finder *cannot be used for focusing*, apart from guessing the distance of the subject as based on the size of its appearance within the frame and then setting the focusing scale of the lens mount accord-

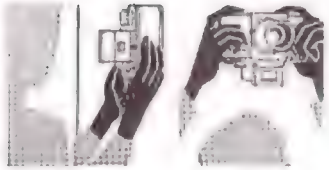
HOLDING—REFLEX FINDER



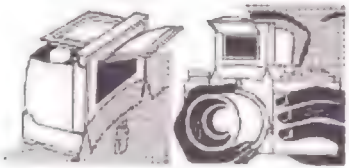
The standard reflex screen shows an upright image, but it is reversed right-to-left.

Using the reflex finder, the Exakta is held firmly against the chest; the right hand operates the helical focusing while the left hand grips the camera, the index finger on the release button (*left*). The magnifier in the hood is used to obtain critical focus (*centre*). To obtain vertical pictures, the operator may stand sideways and hold the camera at eye level (*right*); in this position the image is upside down.

HOLDING—FRAME FINDER AND PENTAPRISM



Left: Pictures can be taken round a corner, using the reflex finder; or over the heads of a crowd by holding the camera inverted and looking upwards on to the focusing screen.



Right: The hood incorporates a rame finder which can be used for normal eye-level work, in particular action shots.

The reflex finder of Models V—VX, IIa and VX1000 is removed by depressing the catch on the front plate and then lifting it off (*left*). On Model RTL 1000 the two locking knobs on either side of the Exakta engraved front plate are pressed down. The pentaprism finder may then be fitted in its place (*left centre*), and the camera used at eye level, held firmly against the face (*right centre*). The camera is turned through 90 degrees for vertical pictures, the image still remaining upright on the screen (*right*).

ingly; only very experienced photographers will be safe from serious errors when applying this method. It is safer first to use the reflex finder for focusing and then to change over to the frame finder for viewing. Both these procedures are unsuitable for photographing moving objects. The frame finder will most efficiently be used for distant photography where infinity setting only is required; or, with subjects nearer to the camera, by using "zone focusing" methods, which, by presetting the lens, ensure that a certain depth of field—within the limits of which the action is expected—will be recorded sharp all over (see page 52). This last method of viewing and focusing is, in fact, preferable to any other when dealing with rapidly moving subjects in front of a reflex camera. It is almost impossible to catch and shoot fast motion when one is looking down with one's attention fixed to the mirror that shows the direction of motion laterally reversed. With the frame finder it is easier to follow movement and keep the (other) eye on it, even before it becomes visible within the finder frame.

Holding

It is obvious that the camera should be held as steady as possible, as the slightest shake, even if not seen in the original negative, will become visible in the enlargement. It is advisable to stand always with your legs apart.

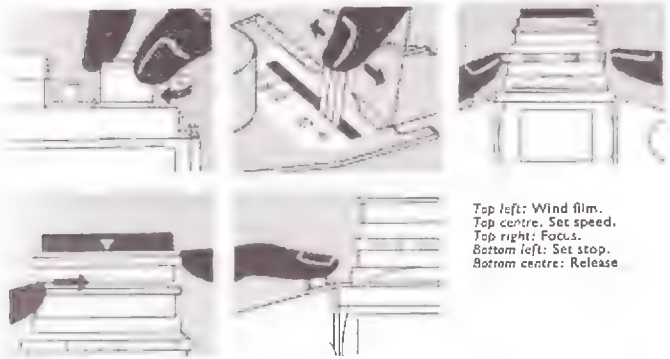
A particularly steady hold of the camera is necessary when working with long-focus lenses (page 52). In this case the centre of gravity is further forward and therefore it is desirable to hold the camera by grasping the helical focusing mount with the right hand, while the left hand steadies the camera and operates the shutter-release.

As the Exakta is horizontally built, it obviously lends itself most simply and naturally to photographs in this position.

When working with the reflex finder at chest level, the camera should be firmly held with the left hand, the index finger of which should be in position on the release knob, while the right hand supports the camera from underneath the camera-body, which should rest against the palm of the hand, while thumb and index finger support and handle the focusing mount.

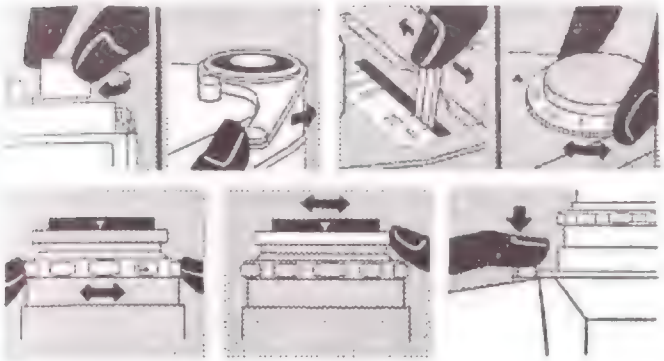
Vertical photographs cannot be taken at chest level. The normal procedure is: hold and focus the camera horizontally, as described before, then raise it to eye-level position, turning it at the same time,

SHOOTING WITH THE EXAKTA



Top left: Wind film.
Top centre. Set speed.
Top right: Focus.
Bottom left: Set stop.
Bottom centre: Release

SHOOTING WITH THE EXA 1 (1961)



Top left: Advance the film (with knob or winding lever). *Top right:* Set the shutter speed. *Bottom left:* Focus. *Bottom centre:* Pre-set the aperture. *Bottom right:* Release.

so that the focusing screen is vertical and the eye examines the image on it at right angles to the object to be photographed. The lens rests in the fork between thumb and index finger of the left hand, while the right hand supports the camera body, so that its thumb comes to lie against the release knob. One actually works "round the corner".

When working horizontally at eye level, either with the pentaprism or the frame finder, the Exakta is grasped with both hands, the camera back rested against cheek, both elbows kept close to the body, and the index finger of the left hand on the shutter release button.

For taking vertical photographs at eye level either with the pentaprism or the frame finder, right and left hands are employed as advised for horizontal photographs, but the camera body is turned 90° to the left so that the right hand holds the Exakta from above and the camera is pressed against the forehead.

To release the shutter (page 26) the shutter-release button should be pressed with the ball of the left forefinger. Use finger pressure only, keep the hand and its grip steady on the camera. The actual pressing down will have to be done slowly and smoothly. The slower the exposure time, the smoother must be the release. Keep your hand clear of the speed knob while releasing!

For slow exposures in the hand it is advisable when working at chest level, to inhale, hold the breath and release smoothly in order to avoid shake.

When using long exposures while holding the camera at eye level, rest the elbows against some support or at least lean against something stable. In this way, 1/10 sec. or more can be risked without incurring camera shake.

When using large aperture and long-focus lenses (pages 45, 48), stand the Exakta on a table or other flat surface.

Use of a tripod is necessary when taking time exposures and working with the delayed-action release, and it is recommended for speeds from 1/30 (1/25) to 1/2 sec. and instantaneous exposures of 1/60 (1/50) sec. with long-focus lenses.

Shooting

Practice the operations described here so that in time they will become practically automatic. After the camera

has been loaded with film, as instructed on page 13, proceed as follows:

1. Wind film transport.
2. Set shutter speed.
3. Focus and determine picture frame
4. Set stop.
5. Release.

1. Wind film transport lever as far as it will go and let it spring back *with brake*. If the camera has been reloaded with new film, it has already been wound for the first exposure.

On the Exa I (1961) and Ia, turn the film transport knob in the direction of its engraved arrow as far as it will go. On the Exa II move the transport lever as far as it will go.

2. The shutter speeds of Exakta and Varex models from 1/30 to 1/1000 sec., as well as B (brief time) and T or Z (time), are set on the shutter-speed knob (beside the film transport lever) by lifting it up, turning the speed required opposite to the index mark on the fixed centre of the speed knob and letting it down again. The numbers given on the knob indicate fractions of seconds, so that 30, 60, 125, etc., mean 1/30, 1/60, 1/125 sec. Short time exposures are made by setting B opposite the indicator, when the shutter will remain open as long as the release button is pressed. Long time exposures are made by setting T (Z in early cameras) to the indicator when a first pressure on the release button will open the shutter, and a second pressure will close it again.

The slow speed and delayed action knob allows for automatic exposure of slow speeds from 1/4 to 12 seconds (on older models from 1/10 sec.) and use of a delayed action release for all shutter speeds from 1/1000 to 6 seconds. Its handling is slightly complicated and should be carefully studied and exercised.

The RTL1000 shutter speed dial carries the range from 1 to 1/1000 sec. and B. It is set by turning the required speed to point to the orange triangle mark.

TO OPERATE THE SLOW SPEEDS:

(*a*) Set shutter-speed knob to B (or T).
(*b*) Wind slow-speed knob *as far as it will possibly turn* in a clockwise direction.
(*c*) Lift slow-speed knob up, then turn it so that required time in black figures comes to lie opposite mark on knob and let knob drop back.* On the RTL1000 the slow-speed knob is turned until the required speed (2 8 sec.) points to the mark on its tensioning lever.
(*d*) Release *smoothly*.

DELAYED ACTION RELEASE FOR SPEEDS FROM 1/30 TO 1/1000 SEC.:

(*a*) Set shutter-speed knob to actual exposure time required.
(*b*) Wind slow-speed knob as far as it will possibly turn in a clockwise direction.
(*c*) Lift slow-speed knob up, turn it so that any red figure comes to lie against the mark on the knob and let knob drop back.*
(*d*) Release *smoothly*.

DELAYED ACTION RELEASE FOR SPEEDS FROM 1/8 TO 6 SEC.:

(*a*) Set shutter-speed knob to B (or Z).
(*b*) Wind slow-speed knob *as far as it will turn* clockwise.
(*c*) Lift slow-speed knob up, turn it so that the exposure time required in red comes to lie against the mark on the knob centre and let knob drop back.*
(*d*) Release *smoothly*.

The delayed action time in all cases is about 12 sec.

The Exa Ia, b shutter speeds are set with the lever or ring moving past a scale of engraved shutter speeds on the top between the rewind knob and finder. The speed figures engraved (B) 30, 60, 125, 175 represent fractions of a second, namely 1/30, 1/60, 1/125, 175 sec. The mark on the lever has to point to the mark on the speed scale. At the B setting the shutter remains open as long as the shutter release is depressed.

The Exa IIa, b and 500 shutter is set by turning its milled outer ring until the desired speed points to the triangular mark.

The RTL1000 delayed action works with the speeds from 1 to 1/1000 sec. only;

(*a*) Turn the shutter speed required to the orange triangular mark.
(*b*) Turn the slow-speed tensioning lever clockwise to its stop.
(*c*) Release on the preset timing device and the exposure will take place 8 sec. after release.

3. Focusing is accomplished by turning the second milled ring on the lens mount which bears the distance markings either until the distance required is opposite the distance mark, or by the usual reflex image control (page 18) until the subject appears fully sharp.

4. The stop is set on the lens mount, where the milled front ring with the indication mark can be turned in line with the aperture figure engraved on the lens. The purpose of the diaphragm is to adjust

*The slow-speed knob of the earlier 35 mm. Exakta models has a black *and* a red mark. In this case, the red figures (when working with delayed action) have to be placed against the *red* mark, and the black figures (when using the slow shutter speeds) against the black mark.

the effective opening of the lens. The smaller this opening, the greater the depth of field (page 52). At the same time, as less light can pass through the lens in any given time, the exposure time must be longer (page 52). The reduction in light means obviously a reduction in brightness of the reflex image with an increase of depth of field. Both *loss of light and increased depth of field make the accurate focusing on the ground-glass more difficult, therefore reflex focusing should always be done at full aperture.*

To facilitate focusing at full aperture with subsequent quick and correct stopping down, the later lenses have preselective aperture setting—those of the 1961 Exakta, the IIa, IIb, VX500, VX1000 and RTL1000 have fully automatic iris preset.

Some of the early lenses have behind the aperture scale a milled ring, and this is pushed backwards towards the camera and turned until its index mark points to the aperture one wants to use. It is then released to spring back into its original position.

Having focused at full aperture, the aperture ring is turned, until it stops at the preselected setting. The exposure is then made without it being necessary to move the camera from the taking position.

Later lenses have an automatic iris preselecting mount. After selecting the aperture required, a tensioning lever on the mount is set, and when the shutter release is depressed the diaphragm is automatically set to the selected aperture just before the shutter starts moving.

The lenses of the 1961 Exakta, IIa, IIb, VX500, VX1000, Exa 500 and RTL1000 do not require tensioning. The iris opens up again automatically when the shutter is released.

5. **Release by pressing the shutter-release knob** *gently*, without shaking the camera. The release knob is blocked as long as the finder hood is closed, to protect against accidental release. A release lock is fitted to the models with interchangeable finder hood in the form of a release knob cover—and on the RTL1000 a locking disc for the right-hand release.

Unloading

After all exposures on the film have been made, it has to be removed from the camera and replaced with a new one. When working from cassette to take-up spool, the procedure is as follows:

1. **Depress rewind pin.**
2. **Rewind film into cassette**
3. **Open camera-back.**
4. **Remove cassette.**
5. **Close camera-back or reload with film.**

1. **After all exposures have been taken,** press the rewind pin on RTL1000 **in camera bottom plate; it will stay automatically depressed.** On earlier models, press the pin situated on the camera top plate between the exposure counter and shutter-speed knob and keep it depressed while rewinding (No. 2). On the original 35 mm Exakta models is a lever in this position which has to be folded up and left in this position while rewinding, while the original Exaktas have a reversing lever which has to be pushed sideways so that the letter R is visible.

   On the Exa I (1961) and Exa 500 the rewind pin is behind the film counter. On Exa I, keep it depressed while rewinding.

2. **Press the centre of the film rewind knob** as far inwards towards the camera body as it will go, this engages the rewind key on the centre spool of the cassette. Then turn the rewind knob in a clockwise direction until the film is completely wound back into its cassette. Correct rewinding can be observed by the movement of the film transport indicator beside the slow-speed knob.

   Incidentally, the centre screw securing the film transport lever turns in the opposite direction to the lever itself.

   Exakta VX and RTL1000 rewind knob has a fold-over handle which has to be turned in the direction of the engraved arrow to rewind film.

   On earlier Exakta models, raise the rewinding key on the camera bottom and turn it clockwise with the thumb and index finger. On the Exa, turn in the direction of the arrow. Turn until a slight resistance is felt, wind over this resistance and give two or three more turns. The film end now comes off the spring of the take-up spool and is wound back into the cassette.

3. **Open the camera back** (see page 13, No. 1).

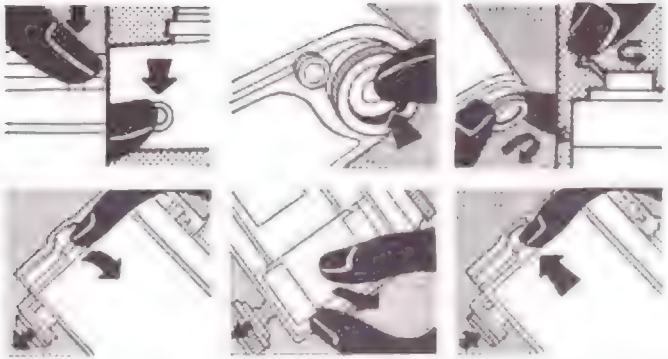
4. **The cassette of exposed film** is taken out by pulling the rewind key downwards as far as it will go.

5. **Before closing the camera back,** push the rewind knob back into its original position. While the rewind pin of the RTL1000, IIa, IIb and VX and Exa will spring automatically back into its normal position, on the earlier models the rewind lever has to be folded down, and on the original models turned sideways so that the letter V is visible.

Unloading without Rewinding

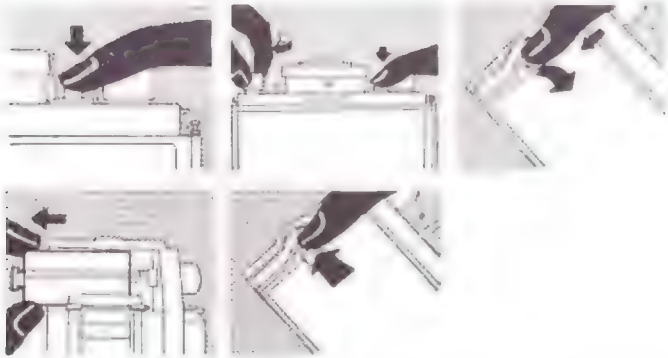
When working from cassette to cassette, the procedure for unloading the Exakta VX, IIa, IIb, VX500 and VX1000 is as follows:

UNLOADING THE EXAKTA



Top left: Depress rewind pin on RTL1000. *Top centre:* Depress centre of rewind knob, not on RTL1000. *Top right:* Rewind film into cassette. *Bottom left:* Open camera back. *Bottom centre:* Remove cassette. *Bottom right:* Close camera back or reload.

UNLOADING THE EXA 1 (1961)



Left: Depress the reversing button. *Centre:* Rewind the film. *Right:* Open the camera and remove the cassette. The upper row refers to the Exa II, the lower row to the Exa I (1961).

1. Cut film with built-in cutting knife.
2. Make two blind exposures.
3. Open camera-back.
4. Remove cassettes.
5. Close camera-back or reload with film.

1. **The knob of the film cutting knife** (on the bottom of the camera body beside the rewind knob) is unscrewed by turning it in an anti-clockwise direction. This knob is fitted to the end of a long rod at the other end of which a knife is fitted. Pulling the knob out (about 2 in.) cuts the film right across. The knife rod is then pushed back and its knob screwed back by turning it clockwise.
2. **Turn the film transport lever** and release twice to wind the film fully into the cassette and so protect it from light.
3. **Open camera back** (see page 13, No. 1).
4. **Remove cassette** (see above, No. 4).
5. **Close camera back** (see above, No. 5).

Changing Partly Exposed Film

Replacing a partly exposed film by another one, as might happen if a few colour photographs were made in between some black-and-white pictures, or a slow-speed film used instead of a fast one, is an easy matter with the Exakta. First note the number of exposed frames on the film counter and then rewind the film back into its original cassette (see page 30, No. 2). One has to be *careful to wind only until a little resistance is felt*. (In the ordinary way, this resistance would have to be overcome in order to pull the film end from the take-up spool, but to do so in this instance would be to run the risk of rewinding the whole film into the cassette, when the film would have to be extricated in the darkroom in order to be able to reload it later on.) The rewound film has to be taken out of the camera. On the beginning of the film, note the number of exposures taken and then put it into a container or wrap it up. Now the camera can be loaded with another type of film.

To use the partly exposed film again, it has to be loaded into the camera in the usual way (see page 13). It is then run through the camera with the lens cap on—winding on and pressing the release until all the exposed frames have been wound off. To be on the safe side, it is

advisable to wind off one frame more than actually exposed. When making "blind" exposures it is wise—in addition to covering the lens to stop it right down and to set the shutter to the highest speed.

Cutting Off Exposed Film Parts

The desire to process some of the 36 exposures of the Exakta without shooting or wasting the whole of the load in the camera might easily arise. For that reason all models have been fitted with the built-in film cutting knife described on page 32. This can be used for cutting off the exposed frames, the cut is made about 1 in. behind the last exposure. If more space is required—for example, when film clips are used in processing—it is advisable to make one blind exposure before bringing the knife into action, which gives about 2½ in. handling space after the last frame. The camera must now be opened in the darkroom, as the exposed film is not protected when opening the camera back to remove it. To remove the film, it is simply drawn from the take-up spool, rolled and wrapped up light-tight ready for processing.

The procedure is simplified when using a take-up cassette in the Exakta IIa, IIb and VX. Make two blind exposures (wind the film and release the shutter twice), open the camera, and cut off the film close to the take-up cassette, which can then be removed.

EXAKTA FILMS

The Exakta uses standard perforated 35 mm. film giving up to 36 exposures 1 × 1½ in. (24 × 36 mm.) at one loading.

DAYLIGHT FILM CASSETTE. The film is supplied in a metal or plastic cassette, which is light tight, so that it can be placed into the camera and removed in daylight.

DAYLIGHT REFILL FILM. The film is supplied on a centre spool and covered with an opaque leader to render it light tight. The daylight refills have to be used in empty cassettes and can be loaded into them in daylight.

DARKROOM REFILL FILM. These are ready-cut lengths, generally for 36 exposures, which must be loaded into empty cassettes in the darkroom.

BULK FILM. Uncut 35 mm. film in lengths of 16 to 100 ft. (5 to 30 m.), from which lengths may be cut, trimmed and loaded into an empty cassette (see page 37).

While the insertion of the loaded cassette is described on page 13, we have to see how the cassette itself is loaded with a suitable length of film in the darkroom.

Safelight

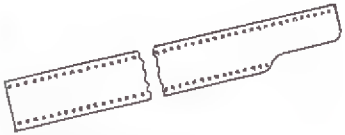
In the case of black-and-white films only, the dark *green* "panchro-safelight" may be used, but it is safest to work in complete darkness. This is not difficult. It is, however, advisable to first practise filling with a dummy film in daylight before starting darkroom work.

Handling, Winding and Trimming the Film

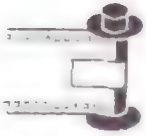
When handling the actual film, particular care must be taken *not to touch its emulsion (matt) side*. It should only be handled and spooled on to the centre spool of the cassette by holding the film by its edges, preferably between thumb and index finger (page 35). At the same time, it is of no less importance that the spot on which the loading is done

HANDLING, WINDING, TRIMMING 35 mm. FILM

Above: Complete cassette (*left*) and its component parts. (*Below:* Handle the film by its edges).



Above: The film ends have to be trimmed to shape.

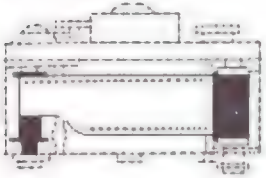


Right: How to attach the film to the spool.

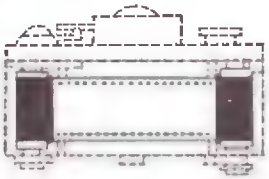
Right: Winding the film on the spool.

Right: Inserting the loaded spool into the cassette.

Below: Cassette inserted in Model IIa, IIb and VX for cassette-to-cassette use. (Exa is similar, but with feed cassette on the left.)



Below: Cassette inserted in the Exakta for cassette-to-spool use. (Exa is similar, but with feed cassette on the left.)



should be perfectly dry, clean and dust free. Only a spotless, clean negative will produce the desired result!

When using bulk film in loading cassettes, the edge of the work-bench can be marked with notches or drawing-pins to indicate various distances, let us say for 12, 24, 36 exposures of film. This considerably simplifies the measuring of film lengths in the darkroom.

The film ends need trimming. At the beginning of the roll of film, make either a straight or wedge-shaped cut for the centre spool of the cassette and measure off the required length of film (see table below). At the end of this, make the curved cut for the take-up spool (page 35). The curved cut should start between the ninth and tenth bottom perforation—when emulsion is towards you—and must not go through a perforation hole.

The ready-cut film is now spooled on the centre spool of the cassette, as described on page 37. One will have to

LENGTH OF FILM REQUIRED FOR ANY NUMBER OF EXPOSURES

Number of Exposures	*Length of Film Required*		*Number of Exposures*	*Length of Film Required*		*Number of Exposures*	*Length of Film Required*	
	in.	cm.		in.	cm.		in.	cm.
1	11¾	30	14	31¼	80	27	51	130
2	13⅓	34	15	33	84	28	52½	133
3	15	38	16	34½	88	29	54	137
4	16½	41	17	36¼	92	30	55½	141
5	17¾	45	18	37¾	96	31	57	145
6	19½	49	19	39½	100	32	58½	148
7	20⅝	53	20	40½	103	33	60	152
8	22	56	21	42	107	34	61½	156
9	23⅜	60	22	43⅜	111	35	63	160
10	25¼	64	23	45	114	36	64½	164
11	26⅜	68	24	46½	118	37	66	167
12	28½	72	25	48	122	38	67⅓	171
13	30	76	26	49½	126	Including trimming		

make sure, while winding on, to hold the film only by its edges.

When winding the film on and off, care must be taken that no great pressure is put on the film, and that the film ends are not squeezed when drawing through the hand. Failure to take the first precaution may result in fogging, while neglect of the latter precaution may give rise to peculiar kinds of exposure effects known as "lightning flashes". These are due to electrical discharges, and appear as dark, zigzag lines running from the edge of the film towards the centre of the picture.

Loading Cassettes

The majority of cassettes consist of a centre spool which is in a shell with top and bottom cover. The film leaves the shell by a light-trapped slot (the cassette mouth). The centre spool can be removed from the shell by removing either top or bottom of the cassette, according to the construction of the particular container.

Most of the cassettes are actually intended by their makers to be used once only, and with the film originally supplied in it. However, provided they are reasonably soundly made and the light-trapping velvet slot is in good condition, these cassettes can be reloaded many times, and will give perfectly satisfactory results—*if handled carefully*.

Cassettes with Bulk Film or Darkroom Refills

1. **Work in the darkroom in appropriate safelight.**
2. **Prepare film.**
3. **Open cassette.**
4. **Fix film on centre spool.**
5. **Wind film on centre spool.**
6. **Insert centre spool into shell: the first 2 in. of film has to project from the light-trap.**
7. **Close cassette.**

2. As described on page 34.
3. As described above.

4. If the centre spool is fitted with a film catch, thread the tapered end of the film into it. In cases where the centre spool is fitted with a spring, thread the end under it and fold it sharply back. If the centre spool is without any suitable fitting to hold the film, it has been proved best to wind a 1½ in. (4 cm.) piece of cellulose tape round the centre spool, so that on either side about ½ in. tape is used to secure the film (see page 35).

7. Where both top and bottom covers are loose, it is essential to fix them to the shell, preferably with a length of adhesive cellulose tape.

Cassettes with Daylight Refills

1. **No darkroom is necessary.**
2. **Remove film wrappings and label of refill.**
3. **Open cassette.**
4. **Introduce refill into shell of cassette; the first 2 in. of paper leader has to project from light-trap.**
5. **Close cassette.**
6. **Pull out paper leader and 2 in. of film.**
7. **Cut off paper leader.**

4. The actual centre spool of the cartridge is not needed.

5. See No. 7 above.

The Choice of Black-and-White Material

There is no such thing as a "best" film for any or every kind of picture. Each type of film has certain characteristics, especially with regard to colour sensitivity, speed, gradation, latitude and, more particularly, grain.

COLOUR SENSITIVITY. Practically all 35 mm. films that can be used in the Exakta are sensitive to all colours. They are what is known as *panchromatic*.

INFRA-RED FILM. Infra-red film is a negative material which, unlike the panchromatic films, is made sensitive to infra-red rays, which are not visible to the human eye. Special applications of this material: black-out photography, long-distance shots, mist penetration, scientific copying and research work. It must be used with an infra-red filter to cut out blue light, to which it is also very sensitive.

COPYING FILM. For copying black-and-white objects (books, ledgers, etc.), a micro-copying film can be recommended. It has fine grain, high resolution and contrast. For coloured originals there is a panchromatic type.

SPEED. The sensitivity of film materials to light in general is expressed as a number of degrees, or as just a number, according to the system used. The principal systems are the American standard (ASA) and the German standard (DIN). Speed is an asset, but it is a quality which must be paid for by possible disadvantages of the material in some other respect. To call the fastest film the best would be just as foolish as to select a racing car for daily motoring.

Slow films are of low sensitivity requiring comparatively great exposure. Their main advantage is the extremely fine grain, permitting a high degree of enlargement without its granular structure becoming unpleasantly visible. Such films also yield images of the greatest sharpness. On the other hand, these slow films are not very suitable for coping with fast movement in other than exceptionally good lighting, nor for general work in poor light. Such films are rated at 40–80 ASA or 17–20 DIN.

Medium speed films still yield a reasonably fine grain with good gradation. They are the most suitable material for all-round photography, other than in poor light. These films are rated at 80–160 ASA or 20–23 DIN.

Fast films with somewhat coarser grain (still acceptable for reasonable degrees of enlargement) will cope with most light conditions, including poor light and interiors in favourable conditions. This is the right film for the photographer who wants to be prepared for the unusual, to arrest fast movement with high shutter speeds, as well as shots in poor light. The ratings are 200–400 ASA or 24–27 DIN.

Ultra fast films are primarily intended for high-speed sports shots in dull weather, interior snapshots in poor light, night photography and ill-lit stage pictures. These films are specialist types for conditions where normal materials are totally inadequate. They should not be used for general photography. The high speed is achieved at some cost in definition and graininess. Speed ratings range from 500–1600 ASA or 28–33 DIN.

Make	Speed in ASA and BS Arithmetic
Adox—	
Adox KB 14	40
Adox KB 17	80
Adox KB 21	200
Adox KB 25	300
Adox UKB-17 Reversal	80
Agfa—	
Agfapan	25
Isopan IF	80
Isopan ISS	400
Agfapan 1000	1000
Direct 26 Reversal	20
Ansco—	
Super Hypan	500
Ferrania—	
P 24	40
P 30	160
P 33	320
P 36	640
Ilford—	
Pan F	50
F P.4	125
H P.4	400
Kodak—	
Panatomic X	40
Plus X	125
Tri-X Pan	400
Konica—	
Konipan S	100
Konipan SS	200
Konipan SSS	400
Orwo, Wolfen—	
NP 15	8
NP 20	80
NP 27	400
Perutz—	
P 14	40
P 17	80
P 21	200
P 25	500
Miniature Reversa	50
Tura—	
Pan 14	40
Pan 17	80
Pan 21	200
Pan 24	400

The above speed figures are based on the latest ASA Standard for film speeds. These figures, when used on the exposure meter, give minimum correct exposures, to make the most of the versatility of the film and of the image quality. They are also the figures quoted by most film manufacturers. Sometimes, films are, however, still rated according to earlier standards which in effect incorporated a generous safety factor against under-exposure—by the simple process of overexposing films about 100 per cent (well within the exposure latitude of most black-and-white films). So you may come across films apparently only half as fast as others of similar type, because of this difference in ratings. The table on this page indicates the current film speeds to be used with the exposure meter, even if the film packing gives a lower rating.

This applies to *black-and-white negative* materials only; speed rating methods have not changed for colour films.

CONVERSION OF FILM SPEED SYSTEMS

ASA & BS Arith. (New) *	ASA Log (New)	DIN	BS Log
3		6	16°
6	1°	9	19°
12	2°	12	22°
25	3°	15	25°
50	4°	18	28°
100	5°	21	31°
200	6°	24	34°
400	7°	27	37°
800	8°	30	40°
1600	9°	33	43°

*Also Weston Master III and later meters

In this table each value represents twice as fast a film speed as the one immediately above it.

In some systems this doubling of film speed means increasing the speed number by 3 each time (BS, Log; DIN), while in others the film speed itself is proportional to the exposure required (ASA).

GRAIN. Silver grains themselves form the picture in the emulsion. To the naked eye they form a compact, dark mass; but under the magnifying glass or microscope the separate clumps of grains are visible. Obviously, if the grain of a small negative is coarse, it will soon become visible by moderate enlarging, and the finer the structure of grain the more enlarging will it allow without showing any unpleasant granular effect in the print. As a rule, it can be said that the grain size is in direct relation to the speed of the film (page 40). The faster the film, the coarser the grain and vice versa. It may be pointed out at the same time that the grain can, to a certain extent, be influenced by development (hence, fine-grain development), correct exposure, choice of paper, etc.

GRADATION. Each film has an ability of its own to reproduce various degrees of brightness on its emulsion. If the film can reproduce only a short tone range in the subject, we speak of a "high contrast" or hard negative material. If it is able to reproduce a wide range of tones in the subject, it is known as a "low contrast", or "soft" film. Generally speaking, low-speed films of fine grain possess a higher contrast than fast films, which are softer.

LATITUDE. Latitude is the ability of the film to yield usable negatives, even with a certain amount of under- or (more often) over-exposure. Films praised for particularly wide latitude may facilitate exposure but are likely to have less "resolving power", causing loss of definition which in big enlargements is just as unpleasant as graininess.

Our negative material has a number of additional properties which help towards good results. There is a special "protective coating", a

hardened gelatine layer on top of the actual sensitive layer which protects it against scratches. The base has been coloured, as a rule grey, in order to avoid reflection of the light coming through the emulsion and thus causing halation.

Colour Film

There are two types of colour film for the Exakta. The first type is negative colour film and produces negatives in colour. These negatives resemble ordinary negatives—the dark parts of the subject are light and vice versa—and in addition the colours are reversed. Thus, blues are yellow or brownish, reds are blue-green, and greens are reddish.

These colour negatives are then printed on a similar kind of material to give colour prints or colour enlargements. You can also use these negatives to obtain black-and-white prints in the normal way.

The second type of colour material is reversal film and produces positive colour transparencies on the film which was exposed in the camera. These transparencies can then be viewed by transmitted light or projected through a projector and colour prints can also be made from them.

Both kinds of colour film are available in two types, balanced for daylight or one of several artificial light sources.

EXPOSING COLOUR FILM. The exposure latitude of colour film is very small. It is therefore important to ascertain the exposure time accurately with a reliable photo-electric meter. Underexposed and overexposed films not only produce dense or weak transparencies, but also the colour values are distorted. Overexposure produces pale, diluted colours; underexposure gives hard, degraded colours.

Avoid great contrast such as deep shadows; preferably have the light coming from behind you.

For photographs by daylight, use daylight type film. Load your camera with artificial light film when taking pictures indoors by the light of high-power electric bulbs or Photofloods. Daylight film may be used in artificial light and vice versa with the special conversion filters recom-

35 mm. COLOUR FILMS

Film	*Type*	*Speed in ASA and BS Arithmetic*	*Processing*
Negative Emulsions			
Agfacolor CNS	Universal	80	U
Ferraniacolor N27	Universal	40	U
Fujicolor N 100	Universal	100	M
Kodacolor X	Universal	64	U
Orwo Color NC16	Universal	32	L
Perucolor	Universal	80	U
Reversal Emulsions			
Agfacolor CT18	Daylight	50	M
Agfacolor CK20	Artificial light	80	M
Anscochrome 64	Daylight	64	M
Anscochrome 100	Daylight	100	M
Anscochrome T 100	Artificial light	100	M
Anscochrome 200	Daylight	200	M
Anscochrome 500	Daylight	500	M
Ektachrome X	Daylight	64	U
H.S. Ektachrome	Daylight	160	U
H.S. Ektachrome B	Artificial light	25	U
Ferraniacolor CR 50	Daylight	50	U
Ferraniacolor Dia A	Artificial light	40	U
Ferraniacolor Dia. 25	Daylight	50	L
Fujichrome R100	Daylight	00	M
Kodachrome II	Daylight	25	M
Kodachrome IIA	Artificial light	40	M
Kodachrome X	Daylight	64	M
Perutz Color C18	Daylight	50	M

PROCESSING: M — films can be processed only by the maker; L — films can be processed only by an approved laboratory through a photographic dealer; U — films can be processed by means of special processing kits.

mended by the manufacturers. For flash pictures, use daylight colour film with blue-tinted flash bulbs.

For distant landscapes, scenes on hazy days and at high altitudes, a haze filter should be used to prevent a bluish cast. This filter is also useful when using electronic flash to produce warmer tones. The filter does not call for any increase in exposure.

DISPLAYING THE COLOUR PICTURE. The colour transparency can be viewed in a variety of transparency viewers. The simplest consist of a magnifying glass set in a frame into which the picture can be inserted. If the viewer is held against a lighted background, the picture appears enlarged and well illuminated. More elaborate viewers have an artificial light source of their own.

The most satisfactory way is to project the transparency in a slide projector which will throw a large picture on to a projection screen. Transparencies will also yield colour enlargements.

The colour negative can be printed or enlarged directly on colour paper to produce a colour print of any size. Alternatively, the colour negatives can be printed on positive transparency film to produce colour transparencies for viewing or projection in exactly the same way as explained above.

EXAKTA LENSES

A wide range of lenses has been mounted for the 35 mm. Exakta cameras. The standard lenses are 2 in. (5 cm.) or 2¼ in. (5.8 cm.).

Some of these lenses were, or are, marketed by the manufacturers of the camera, some quite independently of them. For that reason one may find Exaktas with lenses not listed in this book.

Lenses of any focal length from 20 mm. to 1000 mm. and of apertures up to *f*1.5 can be interchanged with the "standard" lens in any of the 35 mm. Exakta cameras.

A most important feature of the construction of the Exaktas is that, whatever lens may be employed, the correct image and accurate focusing is obtained in the mirror reflex housing. Consequently, no special finders are needed, as this at the same time does away with parallax, no matter how short or how long the focal length of the lens.

This does not hold good for the auxiliary *frame finder* device. The frame finder is correct only for the standard lenses.

The diaphragm on the Exaktas is adjusted by means of a milled ring engraved with the aperture figures on the lens mount. Pre-set or automatic aperture setting lenses are supplied with recent models; their manipulation is described on page 29, No. 4.

The mounts of the lenses are arranged so that accessories (filters, supplementaries, lens hood) can be slipped on or screwed in.

Setting and Changing Lenses

The 35 mm. Exaktas use lenses in a focusing mount. That is to say, the lens itself is fitted with a helical focusing mount. When screwed right back, it is in the infinity position.

Focusing for nearer distances is done simply by turning the lens mount to screw it forward.

The focusing mount bears a distance scale, as a rule in feet, sometimes in metres, with an index indicating the distance to which the lens has been set.

To remove the lens, it has to be held firmly in the left hand, while at the same time pressing the lens catch lightly with the right hand and simultaneously turning the lens firmly to the left. After turning a few degrees, it will be found that the lens disengages and can be lifted from the camera body.

To insert a lens, this procedure is reversed. The lens is held into the tubular mount of the camera body, care being taken that the red dot on the lens comes to lie opposite the red dot on the camera body. Now the lens and mount are turned firmly to the right until the lens catch is heard and seen to slip into the catch on the lens mount.

A *depth of field calculator* is engraved on the lens mount. On either side of the distance indicator the aperture values will be found engraved. After focusing with the mirror reflex arrangement or by setting the index mark to the distance required, one can read off opposite the left-hand stop the depth of field to the foreground and the right-hand stop the depth of field to the background (see page 53).

The treatment and care of lenses is a matter of importance. On account of its chemical composition, optical glass of high quality is susceptible to the influence of moisture, and for this reason touching the glass with the fingers should be avoided. When not in use, the lens should be protected by putting on the lens cover or at least by a lined case. Since complete protection is impossible, the lens surface should be cleaned occasionally with a clean, soft chamois leather.

The Choice of Lenses

*The Domiplan f*2.8 50 *mm., Tessar f*2.8 50 *mm. and Oreston f*1.8 50 *mm can be regarded as "standard" lenses for the Exakta and the most suitable for general use.*

It is wrong to assume that the high correction of the large aperture lenses enables one to use them invariably at their full opening. It will be appreciated that the depth of field can only be comparatively small, so that more often than not stopping down becomes necessary. *Large apertures are, however, useful in adverse lighting conditions and they also ensure a bright focusing image on the ground-glass.*

The possession of one or more of the longer focal length

lenses may tempt the owner to use them more frequently than necessary. It must be remembered that focusing a lens of long focal length has to be done more accurately, as, again, the depth of focus is considerably more limited than with lenses of shorter focal length. At the same time, owing to the longer axis, slow exposure speeds of 1/50 or 1/25 with these lenses tend more easily to camera shake—if a rigid tripod is not used—than with lenses of normal focal length.

All Exakta lenses may be used in enlargers fitted with an appropriate bayonet flange.

All modern lenses are coated. This consists of the application of a microscopically fine deposit of some inorganic substance on the glass surfaces, which reduces considerably the light reflection between glass to air surfaces in the lens. The scatter of light which impairs the contrast of the image is eliminated, giving a more brilliant negative, especially in the regions where the tones are most subdued and where consequently brilliance and contrast are most needed.

Standard Lenses

2 in. *f*2.8 DOMIPLAN: a three-element triplet construction, of good performance and colour-correction suitable for all general photographic work of the amateur photographer.

2 in. (5 cm.) TESSAR *f*2.8: a universal four-element lens suitable for all average exposures, including landscapes, portraits, street scenes, etc., even in unfavourable light conditions. It has particularly even illumination all over the negative and good colour correction.

2 in. (5 cm.) ORESTON *f*1.8: a six-element lens may be considered as the all-round lens of wide aperture for the Exaktas. Apart from average subjects of all types, the particular field of its application is in artificial light work, interiors, the theatre, as well as photography of rapid movements. The definition is to be considered as very good, even with full aperture, and it has great brilliance and covering power. The correction remains undiminished at smaller apertures.

● 2 in. *f*2 DOMIRON: a six-element Gauss-type construction, of high definition and of similar performance to the Pancolar, but with unusual long extension permitting ultra-close focusing down to 34 cm. =13½ in.

Earlier Exakta models were fitted with other lenses, such as 58 mm. *f*2 Biotar (similar to Pancolar), 58 mm. *f*1.9 Primoplan, and others.

Wide-angle Lenses

Wide-angle lenses have shorter focal length and show a wider angle of view than the standard lenses. The increase in the field covered as compared with the standard Exakta lenses is indicated in the table on page 66.

Wide-angle lenses will be found particularly useful for taking interiors where as wide a field as possible should be reproduced, also for taking large groups, for photographing in narrow streets—in fact, everywhere where the distance subject-camera is restricted. Perspective, as depicted by a wide-angle lens, appears the more exaggerated the shorter the focal length of the lens. The exaggeration of perspective of the wide-angle lenses can be put to good use in special cases—for example, to enhance the foreground of a composition or to introduce some other deliberate distortion. One has to put up with the fact that the illumination towards the edges of negatives taken with wide-angle lenses is bound to fall off to a slight degree. This can be offset (to some extent) by giving generous exposure times.

Wide-angle lenses for the 35 mm. Exaktas:

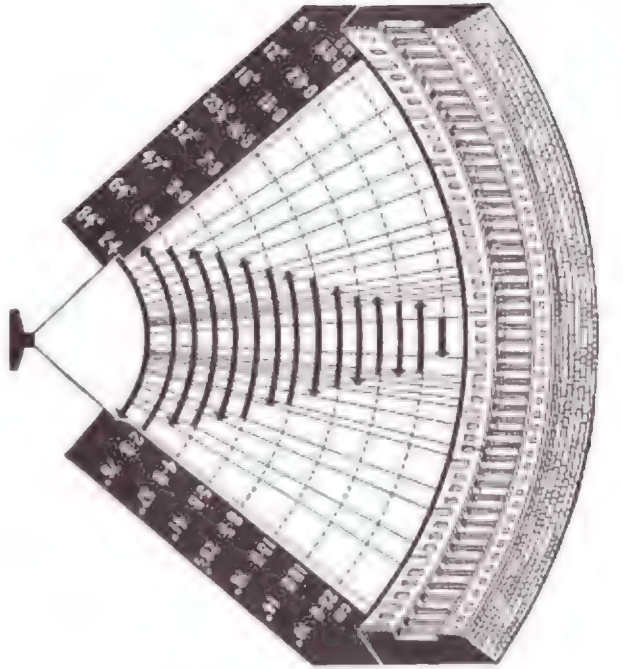
Flektogon *f*4 20 mm.
Flektogon *f*4 25 mm.
Orestegon *f*2.8 29 mm.
Lydith *f*3.5 30 mm.
Flektogon *f*2.8 35 mm.
Primagon *f*4.5 35 mm.

Long-focus Lenses

Long-focus lenses for the 35 mm. Exakta are either lenses of normal construction, having a correspondingly long barrel; or telephoto construction, which permits a much shorter mount. The decrease in field compared with the standard Exakta lens is shown in the table on page 50.

Given the same size negative and the same distance between camera and subject, the longer the focal length the larger is the reproduction of the subject. Long-focus lenses are thus particularly useful for far-distance work, such as photographing mountains or architectural details, where one cannot approach near to the object; this is also the case when taking animals, sports photographs and portraits, where the mellowed perspective which can be got with the longer focus lens from an increased working distance is pictorially advantageous. The disadvantage of long-focus lenses is that they yield less depth of focus than

EXAKTA LENSES



A very wide range of lenses is available for the Exakta cameras, from 20 to 1000 mm. focal length and covering angles of view from 93° to 2½°. All lenses have the focusing movement incorporated in the mount, and special viewfinders are not required since the reflex screen automatically shows the exact picture area. The angles quoted above (24 to 500 mm.) are for the diagonal of the frame.

EXAKTA, EXA II AND EXA 500 LENSES

Name of lens	Focal length	Aperture	Angle of field	No. of elements	Closest focusing distance to film plane	Lens mount diameter (mm.)	Lens mount screw thread (mm.)	Overall length (mm.)	Weight approx. (grammes)	Aperture Control *	Designed for RTL 1000 internal auto pressure release
Flektogon	20	f4	93°	10	6¼ in.	80†	77†	50	330	F.A.	—
Flektogon	25	f4	82°	7	7¾ in.	80†	77†	53.3	300	F.A.	—
Orestegon	29	f2.8	73°	7	13 in.	—	—	—	—	F.A.	√
Oreston	50	f1.8	47°	6	13 in.	51	49	—	—	F.A.	√
● Lydith	30	f3.5	72°	5	13 in.	51†	49†	63	150	S.A.	—
Flektogon	35	f2.8	62°	6	14 in.	51†	49†	48.8	175	F.A.	—
● Primogon	35	f4.5	62°	4	15½ in.	51†	49†	63	170	P.S.	—
Domiplan	50	f2.8	47°	3	30 in.	42	40.5	52	150	F.A	—
Tessar	50	f2.8	45°	4	19¾ in.	51	49	36	150	F.A.	—
● Pancolor	50	f2	45°	6	19¾ in.	51	49	36	175	F.A.	—
● Domiron	50	f2	45°	6	13 in.	51	49	42	200	F.A.	—
● Biotar	75	f1.5	32°	6	31½ in.	60	58	73.8	450	P.S.	—
● Biometar	80	f2.8	32°	5	31½ in.	51	49	56	260	F.A.	—
Orestor	100	f2.8	24°	5	39 in.	—	—	—	—	F.A.	√
● Trioplan N	100	f2.8	24°	3	43 in.	57	55	116	430	F.A	—
● Biometar	120	f2.8	21.5°	5	51 in.	70	67	106	530	F.A.	—
● Primotar	135	f3.5	18°	4	5 ft. 2 in.	57	55	163	465	P.S.	—
Orestor	135	f2.8	18°	5	4 ft. 10 in.	—	—	—	—	P.S.	—
Sonnar	135	f4	18.5°	4	40 in.	51	49	87.4	375	P.S.	—
Sonnar	180	f2.8	14°	5	4 ft. 11 in.	80	77	151.8	1325	P.S.	—
● Primotar	180	f3.5	14°	4	7 ft. 3 in.	70	67	215	500	P.S.	—
Tele Megor	180	f5.5	14°	4	6 ft. 7 in.	51	49	148	350	P.S.	—
Orestogor	200	f4	12°	4	8 ft. 3 in.	60	58	160	600	P.S.	—
Tele Megor	250	f5.5	10°	4	10 ft. 10 in.	60	58	215	600	P.S.	—
Orestegor	300	f4	8°	5	12 ft.	—	—	—	—	P.S.	—
Sonnar	300	f4	8°	5	9 ft. 10 in.	80	77	233	1950	P.S.	—
Tele Megor	300	f4.5	8°	4	10 ft. 10 in.	85	82	274	1800	P.S.	—
Tele Megor	400	f5.5	6°	4	19 ft.	85	82	342	1750	P.S.	—
Fernobjectiv	500	f8	5°	2	19 ft.	80	77	555	—	Normal	—
Mirrorlens	500	f4	5°	4 +2 Mirrors	23 ft.	Built-in revolving mount		306	7300	None	—
Mirrorlens	1000	f5.6	2.5°	4 +2 Mirrors	50 ft.	Built-in revolving mount		—	—	None	—

Data apply to lenses made since 1963.
*Aperture Control F.A.=Fully Automatic; S.A.=Semi-automatic; P.S.=Preset Manual.
†Only usable with special wide-front filters and lens hood.

the standard lenses and thus should be focused more carefully. Also, their size and weight have an adverse influence on our steady grip of the camera, making it advisable to operate longish exposure times with the camera fixed on a tripod.

Long-focus lenses for the 35 mm. Exaktas:

75 mm. *f*4.5 Biotar
80 mm. *f*2.8 Biometar
100 mm. *f*2.8 Orestor
100 mm. *f*2.8 Trioplan
120 mm. *f*2.8 Biometar
135 mm. *f*3.5 Primotar
135 mm. *f*2.8 Orestor
135 mm. *f*4 Sonnar
180 mm *f*2.8 Sonnar
180 mm. *f*3.5 Primotar
180 mm. *f*5.5 Tele Megor
200 mm. *f*4 Orestogor
250 mm. *f*5.5 Tele Megor
300 mm. *f*4 Orestegor
300 mm. *f*4 Sonnar
300 mm. *f*4.5 Tele Megor
400 mm. *f*5.5 Tele Megor
500 mm. *f*8 Fernobjectiv
500 mm. *f*5.6 Orestegor
500 mm. *f*4 Mirrorlens, Jena
1000 mm *f*5.6 Mirrorlens, Jena

While the Exa II, IIa will take the same lenses as the Exakta with some of the long-focus lenses, the edges of the negatives are cut off on the Exa I. This occurs when the distance between the lens and film plane exceeds 70 mm. This is negligible with lenses up to 100 mm. in focal length, but longer focal lengths should not be used.

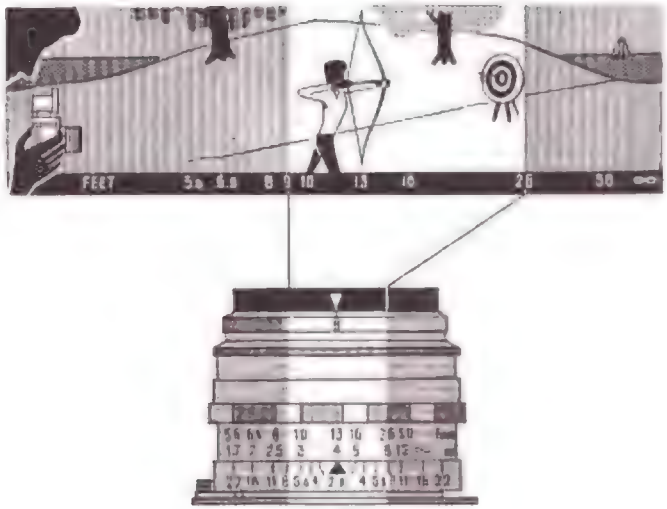
THE TECHNIQUE OF FOCUS

Depth of Field

Strictly speaking, an ideal photographic lens can give a critically sharp image of a single plane only—so far as the image formed in the plane of the film is concerned. This is the "plane of focus", and its distance from the plane of the film represents the distance on which the lens has been focused. Still, points in front of and behind the actual distance focused at *appear* to be sharp. How is this possible? Any point lying outside the plane of focus will not be represented in the plane of the film as a point, but as a small "circle of confusion"; the diameter of this circle of confusion increases in size with the aperture of the lens. Furthermore, the greater its focal length the further the point to be represented lies from the plane of focus, and the larger the circle on the film. Indeed, we know, the longer the focal length and the larger the aperture, the narrower the belt in front of and behind the distance focused which appears to be sharp. Still, the human eye does not perceive an image to be unsharp as long as its departure from "pin-point" delineation does not exceed certain limits. That area in front and behind the plane actually focused which, although not "pin-point" sharp, can be accepted as sharp by the human eye, is described in photographic language as "depth of field".

As a matter of experience it is found that the circle of confusion still appears as a sharp point if it is seen from a distance at which the angle of view which it subtends amounts to two minutes of arc at most. In plain English, at a viewing distance of 10 in. (25 cm.), which may be regarded as normal for a print between 4×6 in., and 6×8 in. (13×18 and 18×24 cm.) in size, this means that the highest permissible diameter of the circle of confusion is 1/6 mm.

For the 24×36 mm. (1×1½ in.) negative of the 35 mm. Exakta this corresponds to 1/30 mm. maximum permissible



The depth of field scale on the Exakta lens mounts shows the range of distances over which the picture will be adequately sharp. The scale shows the series of lens apertures engraved on each side of the setting mark for the distance scale. Having focused the lens, note the distances on the scale opposite the two figures representing the aperture you are using, and these indicate the extent of the depth of field. Above the lens is set at 13 ft. (4 m.); at *f*8 the depth of field is 9 to 26 ft. (2.7 to 8 m.).

diameter of the circle of confusion. Thus, all points which are represented on the 35 mm. Exakta negative by a circle of confusion of not more than 1/30 mm. diameter can be accepted as covered by "depth of field" and therefore as sufficiently "sharp".

Control of Depth of Field

The depth of field—being dependent on the focal length of the lens used, the distance actually focused at and the aperture employed—has to be ascertained for every stop separately.

The reflex image of the Exaktas permits control of the depth of field. In stopping down, the increase in definition to the foreground and the background from the actual point one has focused at can be seen (up to the state where the reflex image grows too dark for observation). Use of the magnifier and focusing hood extension (see page 20) facilitates the observation considerably.

Nevertheless, one should make some allowance for the fact that our focusing screen is only negative size, not the size of the enlarged print, and that the eye cannot distinguish a very small circle from a mathematical point, so it can happen that towards the extremes of the range of depth of field seen on the ground-glass, the enlargement will show blur. Indeed, in every case when importance is attached to good definition in depth, one should rather rely on depth of field tables than on what appears on the focusing screen.

The lenses of the Exakta are in addition fitted with a depth of field calculator, allowing one to read off figures for depth of field for the different stops and distances at once. The lens mount has been provided with a special scale bearing the aperture figures, diverging from either side of the index mark.

To read, first set the distance index (obtained by reflex-focusing or by guessing) to, let us say, 10 ft. Assuming that we are working with a 2 in. (5 cm.) lens with aperture *f*5.6, the two index lines marked 5.6 on the depth of field ring

point on one side to 6 ft., and on the other side to 30 ft. The range of depth of field is therefore from 6 ft. to 30 ft., while actually set to 10 ft.

The reader will be surprised to find these figures very different from those given for the same conditions in our depth of field tables, the reason being that on perfectly unjustifiable grounds 1/10mm. has been allowed by the manufacturers as permissible circle of confusion, compared with the accepted standard of 1/30 mm. for 1½×1 in. negatives (page 52). The depth of field calculator is misleading.

Limits of Depth of Field

The widely held idea that everything is equally sharp within the depth of field and completely unsharp outside these limits is mistaken. It must be emphasized that, as we have said before, critical "pin-point" definition can be expected only in the plane actually focused.

For this very reason care should be taken to *place the focus as exactly as possible at the spot on which the greatest sharpness is required.* It may be emphasized again that focusing should always be done with full aperture of the lens to have the least "depth" on the screen and stopping down only be done afterwards.

In the case of distant landscapes, use should *not* be made of hyperfocal distance (described below) if the greatest sharpness is required in the far distance. In this case, focusing on the object in the far distance will give better results. This applies also to the use of the safety-zone focusing detailed on page 56.

When making use of the built-in magnifier, the Exakta forces us automatically to concentrate on the main subject, as the magnifier shows only a portion of the whole reflex image. This is all the better, as otherwise one is rather apt to judge the picture by its general appearance on the ground-glass, which as regards pin-sharp definition can be somewhat deceiving.

Further, the assumed circle of confusion which has been

laid down for the depth of focus tables is derived on the supposition that the whole negative is viewed or enlarged. When small sections of the negative are greatly enlarged, the depth of field decreases accordingly, because the circle of confusion is enlarged at the same time. That is just one more reason why focusing should be carried out as exactly as possible.

On the other hand, in exactly the same way as sharpness is not absolutely uniform within the depth of field, the region of unsharpness outside the depth of field area increases only gradually.

The Hyperfocal Distance

The depth of field extends for a greater distance in the direction of infinity than towards the camera. When a lens is focused on such a distance that the depth of field just reaches the far distance (infinity), then the lens is focused on the "infinity-near point" or the "hyperfocal distance". This adjustment of focus is always advisable when it is desired to secure adequate sharpness from the farthest distance as far as possible into the foreground, rather than extreme sharpness in the far distance only (see page 57).

Safety-zone Focusing

There are opportunities in a photographer's life which, like time and tide, wait for no man; when, to bring your whole technical armament to bear—reflex focusing, exposure meter and the rest—would be to let your prey escape you for ever. Such situations are best dealt with by applying a kind of pre-prepared depth focusing as follows:

FOR 35 mm. EXAKTA WITH 2 in. (5 cm.) LENS:

Focus at 15 ft. (4 m.), stop 8.
Everything between 10 and 30 ft. will be sharp.

Focus at 30 ft. (9 m.), stop 8.
Everything between 15 ft. and infinity will be sharp.

Hyperfocal Distance and Depth of Field Tables

These tables have been computed in conformity with the principles laid down on page 52 for circle of confusion.

In the depth of field tables the figures on the left of each group relate to the setting of the lens stop. The bold (middle) figures in each group indicate the distance in feet to which the lens has to be set on the focusing mount. The corresponding figures above them give the distance of the near limit (in feet and inches), and the figure below gives the distance of the distant limit (in feet and inches) of the region of depth of field.

HYPERFOCAL DISTANCE

Table of focusing distances, giving the greatest possible depth of field from the foreground to infinity with the 2 in. (5 cm.) lenses.

(For conversion into metric units, see page 90)

Aperture f	*Setting of lens in feet*	*Extent of depth to infinity from:*
1.5	160	80
1.9, 2	120	60
2.2	110	55
2.8	80	45
3.2, 3.5	70	35
4	60	30
4.5	50	25
5.6	40	20
6.3	35	17–6
8	30	15
9	25	12–6
11	20	10
12.5	17	8–6
16	15	7–6
18	12	5
22	10	6

NOTE.—The infinity near point (hyperfocal distance) should not be used when maximum sharpness is required in the far distance.

DEPTH OF FIELD FOR STANDARD 2 in. (5 cm.) LENSES

(For conversion into metric units, see page 90)

f2 (f2.2)	3–11 4 4 1	4–10 5 5–2	5–9 6 6–3	6 8 7 7–5	7–7 8 8–6	8–5 9 9–8	9–3 10 11	11 12 13	13 15 17	17 20 24	25 30 40	35 50 80	55 100 ∞	120 ∞ ∞
f2.8	3 10 4 4–2	4 9 5 5–4	5–7 6 6–6	6–6 7 7–7	7 4 8 8–10	8–2 9 10	8–11 10 11 5	10–6 12 14	12–6 15 18	16 20 27	22 30 48	30 50 130	45 100 ∞	80 ∞ ∞
f3.5	3–9 4 4–3	4–8 5 5–5	5 6 6 7	6–4 7 7–9	8 9 10–4	8–9 10 11–8	10 3 12 14–6	12–4 15 19	15–6 20 28	20 30 50	30 50 117	40 100 ∞	∞ ∞ ∞
f4	3 9 4 4–4	4–7 5 5–6	5–6 6 6–8	6 3 7 7–11	7–1 8 9–2	7 10 9 10–6	8–7 10 11–11	10 12 15	12 20 30	20 30 60	27 50 300	37 100 ∞	∞ ∞ ∞
f5.6	3–8 4 4–5	4–6 5 5–8	5–3 6 7	6 7 8–4	6–9 8 9–10	7–5 9 11–6	8 10 13	9–3 12 17	11 15 24	13 20 40	17 30 120	22 50 ∞	30 100 ∞	40 ∞ ∞
f8	3 6 4 4–7	4–3 5 6	5 6 7–6	5–8 7 9–1	6 4 8 10–9	6–11 9 12–10	7–6 10 15	8–7 12 20	10 15 30	12 20 60	15 30 ∞	18 50 ∞	23 100 ∞	30 ∞ ∞
f11	3 5 4 4–10	4–1 5 6 5	4–9 6 8–2	5–4 7 10–2	5 10 8 12–6	6–3 9 16	6–8 10 20	7–6 12 30	8–6 15 60	10 20 ∞	12 30 ∞	15 50 ∞	17 100 ∞	20 ∞ ∞
f16	3–2 4 5–4	3–9 5 7–4	4 4 6 9–9	4–9 7 12 9	5–3 8 16–7	5–8 9 20	6 10 30	6 8 12 60	7–7 15 ∞	8–3 20 ∞	10 30 ∞	11–6 50 ∞	13 100 ∞	15 ∞ ∞
f22	2–10 4 8 9	3–3 5 6 10	3–9 6 15	4–2 7 25	4–6 8 40	4–9 9 90	5 10 ∞	5–6 12 ∞	6 15 ∞	7 20 ∞	8 30 ∞	9 50 ∞	10 100 ∞	10 ∞ ∞

DEPTH OF FIELD FOR 1½ in. (4 cm.) LENSES

(For conversion into metric units, see page 90)

f2	3–9 4 4–3	4–8 5 5–4	5–6 6 6–6	6–5 7 7–9	7–3 8 8–11	8 9 10–1	8–10 10 11–6	10–4 12 14–3	12–6 15 19	15–9 20 27	21 30 50	30 50 150	43 100 ∞	75 ∞ ∞
f2.8	3–8 4 4–4	4–7 5 5–6	5–5 6 6–9	6–2 7 8	7 8 9–6	7–9 9 11	8–4 10 12–6	9–9 12 15–9	11–6 15 21	14 20 33	18 30 75	25 50 ∞	33 100 ∞	50 ∞ ∞
f4	3–7 4 4–6	4–5 5 5–9	5–2 6 7–1	5–11 7 8–6	6–7 8 10	7–4 9 11–8	8 10 13–5	9–2 12 17–4	10–10 15 24	13–3 20 40	17 30 120	22 50 ∞	28 100 ∞	40 ∞ ∞
f5.6	3–6 4 4–9	4–3 5 6–3	4–10 6 7–11	5–6 7 9–9	6–1 8 11–9	6–7 9 14	7–2 10 16–6	8 12 23	9–6 15 38	11 20 100	14 30 ∞	17 50 ∞	20 100 ∞	25 ∞ ∞
f8	3–4 4 5	4 5 6–8	4–7 6 8–7	5–2 7 10–10	5–8 8 13–6	6–2 9 16–6	6–7 10 20	7–5 12 30	8–6 15 60	10 20 ∞	12 30 ∞	14 50 ∞	16 100 ∞	20 ∞ ∞
f11	3 4 5–10	3–8 5 8	4–1 6 11–1	4–6 7 15	5 8 20	5–4 9 30	5–8 10 43	6–3 12 150	7 15 ∞	8 20 ∞	9 30 ∞	10–3 50 ∞	11–6 100 ∞	13 ∞ ∞
f16	2–10 4 6–8	3–4 5 10	3–9 6 15	4–1 7 23	4–5 8 40	4–9 9 90	5 10 ∞	5–6 12 ∞	6 15 ∞	6–8 20 ∞	7–6 30 ∞	8–4 50 ∞	9 100 ∞	10 ∞ ∞

DEPTH OF FIELD FOR 3–3½ in. (7.5–8.5 cm.) LENSES

(For conversion into metric units, see page 90)

f1.9	3–11 4 4–1	4–11 5 5–1	5–10 6 6–2	6–10 7 7–2	7–9 8 8–3	8–9 9 9–3	9–8 10 10–4	11–7 12 12–6	14–3 15 15–10	18–11 20 21–4	27–6 30 33	43 50 59	76 100 145	320 ∞ ∞
f2.8	3–11 4 4–1	4–11 5 5–1	5–10 6 6–2	6–9 7 7–3	7–8 8 8–4	8–7 9 9–5	9–6 10 10–6	11–5 12 12–10	14 15 16–2	18–3 20 22–3	26 30 35	40 50 67	67 100 200	200 ∞ ∞
f4	3–11 4 4–1	4–10 5 5–2	5–9 6 6–3	6–8 7 7–4	7–7 8 8–5	8–6 9 9–6	9–5 10 10–8	11–2 12 13	13–9 15 16–7	17–10 20 23	25 30 37	38 50 73	63 100 270	160 ∞ ∞
f5.6	3–10 4 4–2	4–9 5 5–3	5–8 6 6–4	6–7 7 7–6	7–5 8 8–8	8–3 9 9–10	9–1 10 10–1	10–8 12 13–8	13 15 17–8	16–8 20 25	23 30 43	33 50 100	50 100 ∞	100 ∞ ∞
f8	3–10 4 4–2	4–9 5 5–4	5–7 6 6–6	6–6 7 7–7	7–4 8 8–11	8–1 9 10–1	8–11 10 11–5	10–5 12 14–2	12–7 15 18–6	16 20 27	22 30 47	30 50 130	45 100 ∞	80 ∞ ∞
f11	3–9 4 4–4	4–7 5 5–7	5–4 6 6–10	6–2 7 8–2	6–11 8 9–6	7–7 9 11	8–4 10 12–6	9–8 12 15–10	11–6 15 21	14 20 33	19 30 75	25 50 ∞	33 100 ∞	50 ∞ ∞
f16	3–8 4 4–6	4–5 5 5–8	5–3 6 7–1	6 7 8–6	6–8 8 10	7–4 9 11–7	8 10 13–4	9–3 12 17	11 15 24	13–4 20 40	17 30 120	22 50 ∞	28 100 ∞	40 ∞ ∞
f22	3–6 4 4–9	4–2 5 6–3	4–10 6 7–10	5–6 7 9–8	6 8 11–9	6–7 9 14	7–2 10 16–8	8–1 12 23	9–4 15 37	11–2 20 100	13 30 ∞	17 50 ∞	20 100 ∞	25 ∞ ∞

DEPTH OF FIELD FOR 4–4½ in. (10–10.5 cm.) LENSES

(For conversion into metric units, see page 90)

f2.8	3–11 4 4–1	4–11 5 5–1	5–10 6 6–2	6–10 7 7–2	7–9 8 8–3	8–9 9 9–3	9–8 10 10–4	11–7 12 12–6	14–3 15 15–10	18–11 20 21–4	27–6 30 33	43 50 59	76 100 145	120 200 500	320 ∞ ∞
f4	3–11 4 4–1	4–11 5 5–1	5–10 6 6–2	6–9 7 7–3	7–8 8 8–4	8–7 9 9–5	9–6 10 10–6	11–5 12 12–10	14 15 16–2	18–3 20 22–3	26 30 35	40 50 67	67 100 200	100 200 ∞	200 ∞ ∞
f5.6	3–11 4 4–1	4–10 5 5–2	5–9 6 6–3	6–8 7 7–4	7–7 8 8–5	8–6 9 9–6	9–5 10 10–8	11–2 12 13	13–9 15 16–7	17–10 20 23	25 30 37	38 50 73	63 100 270	90 200 ∞	160 ∞ ∞
f8	3–10 4 4–2	4–9 5 5–3	5–8 6 6–4	6–7 7 7–6	7–5 8 8–8	8–3 9 9–10	9–1 10 11–1	10–8 12 13–8	13 15 17–8	16–8 20 25	23 30 43	33 50 100	50 100 ∞	67 200 ∞	100 ∞ ∞
f11	3–10 4 4–2	4–9 5 5–4	5–7 6 6–6	6–6 7 7–7	7–4 8 8–11	8–1 9 10–1	8–11 10 11–5	10–5 12 14–2	12–7 15 18–6	16 20 27	22 30 47	30 50 130	45 100 ∞	57 200 ∞	80 ∞ ∞
f16	3–9 4 4–4	4–7 5 5–7	5–4 6 6–10	6–2 7 8–2	6–11 8 9–6	7–7 9 11	8–4 10 12–6	9–8 12 15–10	11–6 15 21	14 20 33	19 30 75	25 50 ∞	33 100 ∞	40 200 ∞	50 ∞ ∞
f22	3–8 4 4–6	4–5 5 5–8	5–3 6 7–1	6 7 8–6	6–8 8 10	7–4 9 11–7	8 10 13–4	9–3 12 17	11 15 24	13–4 20 40	17 30 120	22 50 ∞	29 100 ∞	33 200 ∞	40 ∞ ∞

DEPTH OF FIELD FOR 5⅛ in. (13.5 cm.) LENSES

(For conversion into metric units, see page 90)

f3.5	3–11½ 4 4–0½	4–11½ 5 5–0½	5–11 6 6–1	6–11 7 7–1	7–10 8 8–2	8–10 9 9–2	9–9 10 10–3	11–8 12 12–4	14–6 15 15–6	19–3 20 20–10	28 30 32	45 50 56	80 100 130	150 200 350	470 ∞ ∞
f4	3–11½ 4 4–0½	4–11½ 5 5–0½	5–11 6 6–1	6–11 7 7–1	7–10 8 8–2	8–10 9 9–2	9–9 10 10–3	11–8 12 12–4	14–6 15 15–6	19–1 20 21	28 30 32	44 50 57	78 100 135	130 200 400	400 ∞ ∞
f4.5	3–11 4 4–1	4–11 5 5–1	5–10 6 6–2	6–10 7 7–2	7–9 8 8–3	8–9 9 9–3	9–8 10 10–4	11–7 12 12–6	14–3 15 15–10	18–11 20 21–4	27–6 30 33	43 50 59	76 100 145	120 200 500	320 ∞ ∞
f5.6	3–11 4 4–1	4–11 5 5–1	5–10 6 6–2	6–9 7 7–3	7–8 8 8–4	8–7 9 9–5	9–6 10 10–6	11–5 12 12–10	14 15 16–2	18–3 20 22–3	26 30 35	40 50 67	67 100 200	100 200 ∞	200 ∞ ∞
f8	3–11 4 4–1	4–10 5 5–2	5–9 6 6–3	6–8 7 7–4	7–7 8 8–5	8–6 9 9–6	9–5 10 10–8	11–2 12 13	13–9 15 16–7	17–10 20 23	25 30 37	38 50 73	63 100 270	90 200 ∞	160 ∞ ∞
f11	3–10 4 4–2	4–9 5 5–3	5–8 6 6–4	6–7 7 7–6	7–5 8 8–8	8–3 9 9–10	9–1 10 10–1	10–8 12 13–8	13 15 17–8	16–8 20 25	23 30 43	33 50 100	50 100 ∞	67 200 ∞	100 ∞ ∞
f16	3–10 4 4–2	4–9 5 5–4	5–7 6 6–6	6–6 7 7–7	7–4 8 8–11	8–1 9 10–1	8–11 10 11–5	10–5 12 14–2	12–7 15 18–6	16 20 27	22 30 47	30 50 130	45 100 ∞	57 200 ∞	80 ∞ ∞
f22	3–9 4 4–4	4–7 5 5–7	5–4 6 6–10	6–2 7 8–2	6–11 8 9–6	7–7 9 11	8–4 10 12–6	9–8 12 15–10	11–6 15 21	14 20 33	19 30 75	25 50 ∞	33 100 ∞	40 200 ∞	50 ∞ ∞

DEPTH OF FIELD FOR 7⅛–8 in. (18–20 cm.) LENSES

(For conversion into metric units, see page 90)

f4.5	5–11½ 6 6–0½	6–11½ 7 7–0½	7–11 8 8–1	8–11 9 9–1	9–11 10 10–1	11–10 12 12–2	14–8 15 15–4	19–6 20 20–7	29 30 31	47 50 54	88 100 113	160 200 280	700 ∞ ∞
f5.5 (f5.6)	5–11½ 6 6–0½	6–11½ 7 7–0½	7–11 8 8–1	8–11 9 9–1	9–11 10 10–1	11–10 12 12–2	14–8 15 15–4	19–5 20 20–8	28–6 30 31–6	46 50 55	86 100 120	150 200 300	600 ∞ ∞
f6.3	5–11½ 6 6–0½	6–11 7 7–1	7–11 8 8–1	8–10 9 9–2	9–10 10 10–2	11–8 12 12–4	14–7 15 15–6	19–3 20 20–10	28 30 32	45 50 56	83 100 125	140 200 330	500 ∞ ∞
f8	5–11 6 6–1	6–11 7 7–1	7–10 8 8–2	8–10 9 9–2	9–9 10 10–3	11–8 12 12–4	14–6 15 15–6	19–1 20 21	28 30 32	44 50 57	78 100 135	130 200 400	400 ∞ ∞
f11	5–10 6 6–2	6–10 7 7–2	7–9 8 8–3	8–9 9 9–3	9–8 10 10–4	11–7 12 12–6	14–3 15 15–10	18–11 20 21–4	27–6 30 33	43 50 59	76 100 145	120 200 500	320 ∞ ∞
f16	5–10 6 6–2	6–9 7 7–3	7–8 8 8–4	8–7 9 9–5	9–6 10 10–6	11–5 12 12–10	14 15 16–2	18–3 20 22–3	[illegible] 30 35	40 50 67	67 100 200	100 200 ∞	200 ∞ ∞
f22	5–9 6 6–3	6–8 7 7–4	7–7 8 8–5	8–6 9 9–6	9–5 10 10–8	11–2 12 13	13–9 15 16–7	17–10 20 23	25 30 37	38 50 73	63 100 270	90 200 ∞	160 ∞ ∞
f32	5–8 6 6–4	6–7 7 7–6	7–5 8 8–8	8–3 9 9–10	9–1 10 10–1	10–8 12 13–8	13 15 17–8	16–8 20 25	23 30 43	33 50 100	50 100 ∞	67 200 ∞	100 ∞ ∞

THE TECHNIQUE OF EXPOSURE

The correct exposure time depends on two sets of circumstances:

(1) The amount and colour of light reflected from the object to be photographed. This, in its turn, depends on the season of the year, time of day, situation, weather, etc.

(2) The speed of film, the kind of filter used, the aperture employed and probably an allowance for an increase in exposure in the case of special fine grain development.

The correct exposure time can be ascertained by:

EXPOSURE TABLES. These are based on mathematical calculations and practical experience. They tabulate all or most of the factors given above, and, if used with discretion, will give an exposure-figure which lies within the latitude of the film. A simplified table is usually contained in the leaflet packed with the film.

PHOTO-ELECTRIC EXPOSURE METERS. They are accurate and dependable means for arriving at the right exposure time. Some consist of a photo-electric cell which converts light-energy into electricity, which in turn moves an indicator over a table of light values.

CdS exposure meters employ a cadmium sulphide photo resistance. They have a narrow angle of acceptance, are very sensitive and accurate. They employ a mercury button battery which has an average life, in normal use, of about two years.

To the experienced Exakta photographer, *the brightness of the image on the reflex focusing screen soon becomes a useful guide to the correct exposure.* It acts to some extent as an optical exposure meter. By using a standard exposure time, e.g. 1/60 sec. for average subjects, it can become a matter of habit to vary the aperture so that the screen has a standard intensity of illumination or to see how far into the corners of the screen details may be observed but the latter only if the subject is of even illumination).

EXAMAT TTL Meter Attachment

This is a pentaprism finder attachment for the Exakta and Exa I cameras which permits combined viewfinding and exposure measuring by means of a built-in CdS meter, measuring the light through the lens.

There are three methods of exposure measuring:

1. **By varying the aperture setting with a pre-selected shutter speed.**
2. **By varying the shutter speed with a pre-selected aperture.**
3. **By measuring the shutter speed-aperture combination as on ordinary manually operated meters.**

To use the Examat:

1. **Insert battery** (PX13) by removing battery cover on the side of the unit with a coin, insert battery with + sign upwards and replace cover. The life of a battery exceeds one year.
2. **Insert the Examat into the top of the camera body.**
3. **Set film speed by turning the two studs in the top of the meter disc** until the required speed points to the index mark on the appropriate ASA or DIN cut-out window.
4. **Switch on meter** by sliding the switch on the top left to the green "switched-on" position.

The procedure then varies according to the metering method used.

For aperture adjustment metering:

5. **Set camera lens to manual aperture setting.**
6. **Set on the camera the preselected shutter speed.**
7. **Set the shutter speed on the main setting dial of the meter** in line with the white setting mark.
8. **Turn aperture ring of the lens** until the meter needle in the viewfinder points to the zero index mark.

If the meter needle cannot be aligned with the index mark, this indicates that with the shutter speed preselected one cannot obtain a correct exposure and a slower shutter speed may have to be preselected. After use, switch off the meter.

For shutter speed adjustment metering:

5. **Set camera lens to manual aperture setting.**
6. **Stop lens down to the preselected aperture value.**
7. **Turn the main setting dial,** with the viewfinder eyepiece at eye level, until the meter needle in the viewfinder lines up with its zero mark.
8. **Read off the correct shutter speed** to be set on the camera opposite the white setting mark and take your picture. After use, switch off meter.

For manual metering:

5. **Set camera lens to automatic iris.**
6. **Turn the widest aperture value of your lens to the white setting mark on the aperture dial.**
7. **Turn the main setting dial** until the meter needle in the finder points to the zero mark and switch off meter.
8. **Select any shutter speed and aperture combination** which face each other on the shutter speed and aperture dials and transfer them to the camera and lens.

Exposure Meter Attachment

A special exposure meter unit was provided for the Exakta Varex, but was discontinued in 1961. It is a combination of a pentaprism focusing unit (still available, see page 21) with a built-in photo-electric exposure meter and, in addition, it incorporates a direct vision optical finder.

To use the meter:

1. **Set film speed.**
2. **Point camera at subject.**
3. **Set index to needle position.**
4. **Read off aperture-exposure combination and transfer to lens and shutter.**

1. The film speed is set by turning the wedge-shaped disc with the printed aperture numbers (from 2 to 22) to the appropriate value in either DIN (left) or ASA (right).
3. The light falling on the cell produces a certain deflection of the needle in the cut-out window on top of the meter. Rotate the outer disc until the *black* triangle (▽) engraved on it points to the black or white band facing the needle.

In poor light there may be no noticeable movement of the meter needle. In this case, open up the front cover of the cell and set the *red* triangle (▽) opposite the black or white band facing the needle.

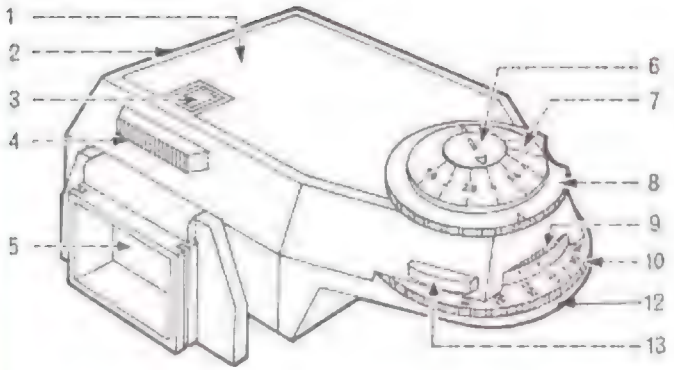
4. The correct aperture to use (in the cut-out in the inner disc) faces the exposure time you want to use (on the bush of the outer disc) or vice versa. Transfer this result to the lens and shutter.

A translucent plastic disc which may be clipped over the closed or open cell is intended for incident light measurement. See page 72.

The TTL Pentaprism for the Exakta RTL1000

The TTL pentaprism for the Exakta RTL1000 combines the pentaprism focusing-viewing system described earlier with internal through-the-lens measuring of the exposure,

TTL PENTAPRISM FOR EXAKTA RTL1000



The TTL pentaprism finder replaces the normal pentaprism or reflex finder on the Exakta RTL1000 The features are: 1, TTL pentaprism. 2, Battery chamber. 3, Switch signal. 4, Meter switch. 5, Viewfinder eyepiece. 6, Centre disc of aperture setting device. 7, Lower disc of aperture setting device. 8, Change over switch. 9, Film speed setting disc. 10, Shutter speed setting disc. 12, Shutter speed setting mark. 13, Push-button for film speed setting

automatically taking into account film speed, shutter speed, aperture, any filters, extension tubes, etc., which may be connected to the camera.

The light measurement applies when the TTL prism is used in conjunction with the regular focusing screen with microprism centre. If a completely matt focusing screen is employed, the film speed has to be increased by 4 DIN and with a matt screen with 6 mm. bright centre spot by 3 DIN.

Fitting the TTL Pentaprism

The connecting of the TTL prism is the same as described earlier. After fitting the prism into the camera, engage the driver pin of the shutter-speed knob on the camera in the grooves on the base of the prism by rotating its shutter-speed setting disc from stop to stop. When correctly connected, the shutter-speed knob will turn when the shutter-speed disc of the prism is turned.

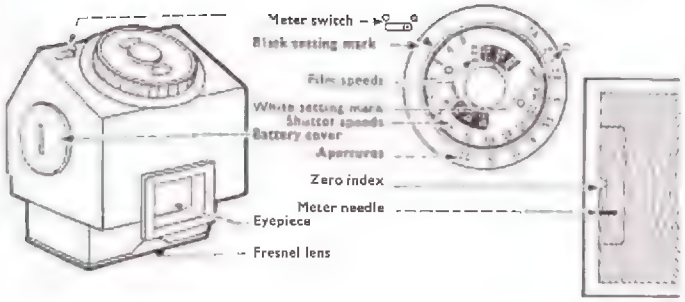
Using the TTL Pentaprism Meter

Set the film speed. First turn the shutter-speed disc so that the orange triangle is visible. Now turn the lower disc of the aperture setting device so that its line points to the line of the centre disc and push the change-over switch home at the two lines. The film speed (orange figures ASA, white figures DIN) is finally set by pressing the push-button as far as it will go into the TTL prism and turning the lower disc of the aperture setting device with its white line to the ASA or DIN speed of the film to be used.

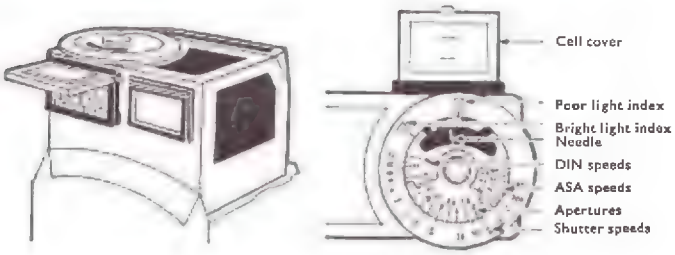
Open Aperture Measuring

With automatic aperture lenses (see page 29), set lens to automatic (A), push change-over switch on lower disc home at the recess without line. Raise and turn the lower aperture setting device so that the widest aperture of the lens used points to the triangular mark on the inside disc (intermediate values may be set). Let the lower disc return. One

EXPOSURE METER UNITS



The Examat converts the Exakta and Exa I cameras to TTL types, enabling accurate light readings to be taken through the camera lens, no matter what lens or attachments are in use. It replaces the normal pentaprism finder or focusing screen and serves as a combined viewing/focusing and exposure meter attachment. Its CdS meter is powered by a battery housed in the side of the unit.



The earlier exposure meter unit for the Varex and Exa I was a combined pentaprism focusing unit and exposure meter, but did not read through the lens. It also incorporated a direct-vision viewfinder.

can NOT measure with incorrectly set widest aperture (smallest aperture number).

To measure, pre-select and set shutter speed on the shutter-speed disc (one can NOT use intermediate speeds). Push meter switch (above eyepiece) to the left. A green circle will appear in the window above it to indicate that the meter is switched on. Point the camera towards the subject and turn the lower disc of the aperture setting device until the pointer on the left-hand side in the viewfinder shows in the centre of the engraved circle. If the circle cannot be reached, use a slower shutter speed. Read off on the aperture setting device the aperture value pointing to the triangular mark and transfer this to aperture setting ring of the lens. Now release. Switch off the meter by turning the switch to the right.

One can reverse the procedure and pre-select the aperture. Turn the lower disc of the aperture setting device until the pointer shows in to the circle. Turn shutter-speed disc until the required aperture on the central disc of the aperture setting device points to the triangular mark on the lower disc. It may be necessary to slightly readjust the aperture on the lens if one does not arrive at a full aperture number. If the required position on the pointer cannot be obtained, a larger or smaller aperture has to be selected.

Stop Down Measurement

To use non-automatic lenses or automatic lenses for manual aperture setting, push the change-over switch of the lower disc home at the recess line. Set the shutter-speed setting device so that the lines of all three discs are on top of each other by raising the lower disc and turning it.

To measure, preset the shutter speed by turning the shutter-speed setting disc above the mark. *NO* intermediate values must be set. Switch on meter—a green indicator circle will appear in the window above the switch. Point camera to subject and turn the lens aperture ring until the pointer on the left of the viewfinder is in the centre of the

circular mark there engraved. If this position cannot be reached, pre-select a slower shutter speed. Release and switch off meter.

One can reverse the procedure and pre-select the aperture required on the lens, and turn the shutter-speed setting disc until the pointer in the finder show to the circle, release and switch off meter. Do not set intermediate shutter-speed values; if necessary, make fine corrections by means of the aperture setting ring. If pointer position cannot be reached, pre-select a wider or smaller lens aperture.

Fitting and Changing Battery

The TTL pentaprism for the RTL1000 Exakta is fitted with a 625 or equivalent mercury oxide battery. The life of the battery in normal use is well in excess of one year.

To change the battery, unscrew the battery compartment in the side wall of the TTL prism, remove old battery and replace by new one, making certain that its plus (+) sign points towards the screw lid and close lid again. Keep battery and its contacts free from finger marks, perspiration, dirt, etc., which can impair the function of the meter. The battery should be removed and stored in a dry place if the TTL prism unit is not used for some time.

Using an Exposure Meter

To get the best results, the exposure meter has to be used intelligently. This may look like a contradiction, since we have already said that it is an accurate light-measuring instrument. But light from all parts of the subject—highlights, shadows and middle tones—falls on the meter; so the reading it gives us is an average one for the whole subject area.

The Exakta meter—as any other—is scaled to suit typically average subjects i.e., subjects with average areas of light, dark and middle tones. So if you point the meter at a subject of this kind, the exposure reading will be correct.

But if the subject is not average—if there are large highlight areas and little shadow, or large shadow areas with few highlights—then you have to modify the exposure reading to obtain the best results.

So there is more to using a meter than just pointing it at the subject and accepting without question the reading indicated.

REFLECTED LIGHT MEASUREMENT. The usual method of using the meter is to point it directly at the subject. The light reaching the photo-electric cell is therefore that reflected by the subject, so this method is called "reflected light measurement"

This gives the correct exposure reading provided the subject has an average mixture of highlights, shadows and middle tones. But if there is a large bright area, or a large dark area, the best method is to go near to the main subject and take a close-up reading. For example, if the subject is a figure against a white or dark background, by going closer you will reduce the amount of background affecting the meter and therefore get a reading in terms of a more average subject, which is what you want.

For some subjects you can take a reading from really close up, aiming the meter at the part of the subject that you want to make sure has optimum exposure For instance, many photographers take a close-up reading of the sitter's face in portraiture; out-of-doors you can take the reading from the back of your hand instead of going up to the subject.

If you cannot go close up to a subject that needs a close-up reading, then try to find something near at hand that is similar in tone to the subject, and take a reading from this

When taking readings of general scenes, including a good deal of sky you have to tilt the meter down slightly to reduce the area of sky "seen" by the meter. The sky is a bright highlight, and by tipping the meter down to exclude some of it the subject becomes "average" in tone range.

Open views, such as distant landscapes, usually have very light shadows, so you can give a shorter exposure than the meter indicates. It is usual to give half the exposure i.e., use the next higher light value.

INCIDENT LIGHT MEASUREMENT. Another method of assessing exposure is to measure the strength of the light falling on the subject instead of that reflected by it. But if you point the meter straight at the light you get a much higher reading than if you point it at the subject. So the light has to be cut down for the meter to indicate the correct exposure. This is done by sliding the white diffuser supplied with the Exakta meter over the honeycomb cell of the meter which is designed to reduce the light just the right amount. It also serves another important purpose, and this is to ensure that the meter includes all the light falling on the subject over an angle of almost a full 180°.

The incident light method is particularly useful for reversal colour films, and for subjects with contrasting backgrounds when it is impossible to make a close-up reading.

To take a reading, the method is simply to turn your back on the subject and point the meter in exactly the opposite direction. If the main light—say, the sun—is coming from the side, don't just partly turn round and point the meter at this; turn round completely and

let the main light strike the meter at the same angle that it strikes the subject.

If the light on the subject is different from that on yourself at the camera position—say, if the subject is in the shade and you are in the sun—you must then go up to the subject and take the reading, pointing the meter towards the camera position.

AGAINST THE LIGHT subjects are extreme cases of non-average tone range. The main lighting becomes a very bright highlight in the field of view, so if you point the meter straight at the subject it will indicate too short an exposure and give you a silhouette effect in the final picture.

This is all right if you want a silhouette. But if you want correct exposure for the subject, you should either take a close-up reading or take a reading from the camera position and give four to eight times the exposure indicated. Another way is to use the incident light diffuser on the meter, pointing it towards the subject from the camera position, and then double the exposure indicated.

COLOUR FILMS have only a small exposure latitude, so particularly careful reading is advisable. The meter is used in the *same* way as for black-and-white films, although the incident light method is often considered best for reversal films. This is because exposure of these should be based on the highlights, and the diffuser itself constitutes a highlight, with the meter in effect reading directly from it.

Because of the importance of the highlights, if you are using the meter without diffuser for an against the light shot, it is best to only double the reading, and not multiply it four to eight times as recommended for black-and-white negative films.

THE TECHNIQUE OF TONE

The Use of Filters

The photographic black-and-white film, even though panchromatic, fails to render colours in their true black-and-white tone values, so that the photograph often gives quite a false impression of the real scene. The explanation of this discrepancy is the following.

Scientifically speaking, to the human eye yellow appears to be over ten times as bright as blue, three times as bright as red, and one and a half times as bright as green. The average panchromatic film, however, registers blue with a brilliance of about four-fifths that of yellow, green with one-third, and red with two-thirds of the brightness of yellow.

It is therefore evident that in order to obtain a colour rendering which will correspond with some degree of accuracy to the impression of colours received by our eye, the comparative sensitivity of the various colours to each other in our film will have to be corrected. This can be achieved by the use of filters.

Filters are intended to correct on our negative material the various degrees of brightness of the actual picture. Principally, *they lighten objects of their own colour and darken those of their complementary colour* (e.g. a yellow filter will darken the blue of the sky). They may be used to obtain a colour rendering in our picture which corresponds more closely to the impression made upon our eye by the object: here we speak of "correction filters". Filters may also be employed to produce certain effects; for instance, our picture can be made to show heavy clouds against a particularly dark sky, whereas the actual landscape revealed only light clouds in a blue sky. Filters employed to such ends are termed "effect filters".

All filters cut out certain parts of the light and an increase in exposure time is always necessary when using them.

Exact figures can only be given for each particular case, according to the film used, for the exposure ratio depends not only on the nature of the filter, but on the colour sensitivity of the film and on the colour of the light in which the photograph has to be taken.

FILTER FACTORS

In Daylight	*Panchromatic Film*	*Infra-red Film*
Yellow—Light (1)	1.5	—
Medium (2)	2	—
Dark (3)	3	—
Green —Light	3	—
Medium	4	—
Orange—Light	4	—
Dark	5	—
Red —Light	7	10
Dark	—	15
In Artificial Light		
Yellow—Light (1)	1.5	—
Medium (2)	1.5	—
Dark (3)	2	—
Green —Light	3	—
Dark	5	—
Blue	1.5	—

The following list gives a summary of the filters recommended and a short explanation of their use. The best practical guide to choosing and handling filters is the ***Focal Filter Chart.***

YELLOW FILTERS mainly reduce the actinic effect of blue, rendering it darker, and are therefore particularly suitable for landscape photography in order to obtain clearly defined cloud effects on a normal blue sky. In the case of a very light blue sky, a darker filter should be used and vice versa.

GREEN FILTERS have a similar effect to yellow filters, but they also hold back red (render it darker), to which some panchromatic films are comparatively oversensitive (photographing it too light).

SKY FILTERS are designed for photographing scenes with a bright background and a dark foreground, such as often occur in landscape photography. They serve mainly to avoid partial overexposure, and are obtainable as graduated green or yellow filters. If the top part of the object (as in landscapes) is bright, the coloured part of the filter should cover the top part of the lens. No exposure increase is necessary if the exposure time has been determined for the darker part of the picture.

ORANGE FILTERS give overcorrection, and serve, therefore, as an "effect" filter for drawing *heavy* clouds against a dark sky, and very clear distances in landscapes, eliminating light haze, etc.

RED FILTERS are of still stronger effect than the orange filter, for *extreme* contrast, creating black sky with brilliant clouds, faking sunshine into moonlight effects, etc.

DARK RED FILTERS to be used only with infra-red film. Chiefly used for scientific purposes, it penetrates mist.

BLUE FILTERS are for panchromatic film in artificial light. They absorb part of the red sensitivity. This results in better skin tones and darker reds (lips).

FILTERS FOR COLOUR PHOTOGRAPHY—see page 43.

Polarizing Filter

Highly polished subjects can be very difficult to illuminate successfully so as to obtain a true photographic rendering, since they will reflect too much light and so spoil the reproduction with a glare which obscures the detail. To overcome this difficulty the polarizing filter has been introduced. It suppresses light vibrating in one particular plane, while light vibrating in a plane at right angles to this will freely pass. Light reflections from glass, china, enamel, polished wooden surfaces, water, vibrate to a large extent in one plane (=it is polarized) and can therefore be almost extinguished by placing the polarizing filter in proper position over the lens.

The filter has to be rotated to find out its best position on the lens. The Ilfoktas are ideal for this observation. The filter is simply held in front of the lens, and then by slowly rotating the filter one can find the best or desired result on the reflex-focusing screen, and push the filter on to the lens in the position selected. As the polarizing filter is slightly tinted, the exposure time should be increased, the factor being about three times.

CARE OF THE CAMERA

Storage

When not in use, the camera should be protected from damp and dust, preferably in its case, and, as an additional precaution, inserted into a polythene bag.

Care should be taken to see that the camera is not kept in abnormally high or low temperatures -normal room temperature is best.

Take the precaution of removing any batteries, because however well made these may be there is always a risk of deterioration and corrosion.

Exercise

Cameras (like most mechanical instruments) need to be exercised regularly to keep them in good condition. Store your camera where you can get at it easily and put it through its normal operations at least once a month:

1. Set the shutter release and fire several times.
2. Turn to a slow shutter speed and again set the shutter release and fire. Also operate delayed action device.
3. Examine the exposure meter for correct operation.
4. Check film transport
5. Check the viewfinder.

These exercises will keep the mechanism in good order, retaining the natural qualities of the lubricant—thus ensuring the camera is ready for instant use when required.

Running Test after Storage

Before embarking on a holiday where your camera will be your constant companion, or on an important assignment, make a few trial exposures. It is advisable to test the camera at least four weeks prior to your departure to give time for a test film to be exposed and processed. This will avoid a possibly spoiled holiday record.

Keeping the Interior Clean

When your camera is used on the beach, or other conditions where dust or sand can easily infiltrate into the mechanism, take the precaution of putting the instrument with its case into a polythene or other container so that flying dust, sand, etc., particles are prevented from entering the camera. This applies particularly, of course, if it is laid down on a sandy beach. Furthermore, avoid leaving the camera in such a position that direct sunlight is allowed to fall upon it. This could ruin a camera.

Small chips of film can easily damage the mechanism; therefore, always make sure that the inside of your camera is spotless. Check your camera every time it is loaded with film.

Treating the Camera with Care

Your camera is a fine, precision instrument. It has been produced with great care and attention to detail. Do not allow it to be swung by its shoulder strap, thrown into the back of a car, nor treat as if it were as robust as a battleship. If you protect the camera against possible damage due to a knock, you will be amply repaid by years of excellent and trouble-free service.

Coping with Tropical Conditions

High and widely varying temperatures with low humidity, as occur in desert regions and dry seasons, and very high humidity in rainy seasons, call for special precautions to protect the life and continued good performance of the camera. These conditions also cause the growth of moulds on organic matter. Sand, dust and insects may present problems.

The camera should be kept dry and clean. Leather parts should be wax polished, metal parts lightly greased. Never leave the camera unnecessarily exposed to heat. Always keep it in its case. The lens should be covered with the lens

cap when not in use. Outer lens surfaces have to be kept clean, dirt and grit removed with an air-blower and by tapping. Wipe the lens surface with cotton-wool or open mesh fabric (butter muslin) when required.

Store photographic equipment in an airtight metal box or a tin which should be sealed with adhesive (e.g. medical) tape. In a humid atmosphere, add some desiccating agent (e.g. silica gel).

Condensation on the lens may occur when the camera is moved from a cool place into humid heat; this has to be removed before use and the whole camera carefully wiped before re-storing.

Films should not be kept longer than six months in their original airtight tins (tropical packing) at continual temperatures of 90°F (32°C). At continual 100°F (38°C), the life of most films is limited to a month or two. Keep films for as short a time as possible in the camera. Storing camera and film in the glove compartment of the car is inviting trouble.

Films should be processed as soon as possible after exposure—within a week or two or, in very hot humid climates, within a few days. Keep the film in an airtight container with desiccant (to absorb moisture). If possible, keep in a refrigerator, but only if you can dry out the exposed film and the container is sealed.

CLOSE-UP WORK

The single-lens reflex cameras are particularly suited for close-up photography. When working with supplementary lenses or extension tubes, the actual image covered, as well as the exact definition, can be controlled on the reflex-focusing screen. Parallax, which makes close-up work with almost any other type of camera at least very difficult or necessitates expensive auxiliary attachments, simply does not exist in the Exaktas.

Supplementary Lenses

The Exakta cameras can be focused down to about 3 ft. This figure varies somewhat in accordance with the lens employed.

The field covered at 3 ft. with a 2 in. (5 cm.) lens is $25\frac{1}{2} + 17$ in.

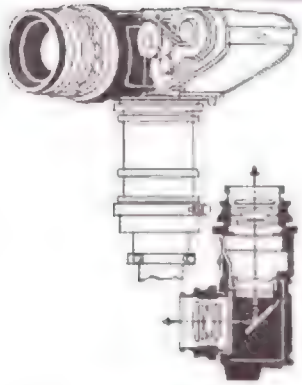
To photograph at closer range for table top, copying and similar work, supplementary lenses can be used. A range of three lenses, giving a scope which can reasonably be described as covering all practical needs, are a +1 diopter, a +2 diopter, and a +3 diopter. These may be had from photographic dealers or opticians. One will find it convenient to get these lenses of suitable diameter to fit into an interchangeable filter mount, so that one mount only is required and a lens can be inserted in accordance with the distance at which one has to work.

The distances covered by these supplementary lenses are:

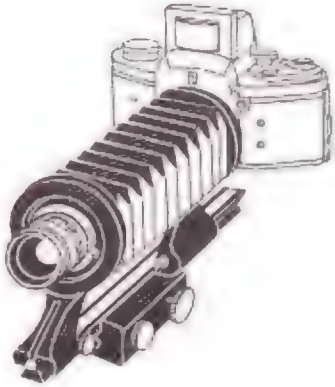
Supplementary Lens	*Distance Covered*
+1 diopter	from $39\frac{3}{8}$ to 19 in. (100 to 50 cm.)
+2 diopter	from $19\frac{3}{4}$ to 13 in. (50 to 33 cm.)
+3 diopter	from $13\frac{1}{8}$ to $9\frac{1}{2}$ in. (33 to 25 cm.)

The field covered, the distance at which the lens has to be set, as well as definition can be observed on the reflex ground-glass. The following table giving these figures is intended for general information and purposes of comparison:

Right: The two-in-one adaptor A) provides 5 mm. lens extension. The extension tube set (B, C, D, E) gives 10 to 60 mm.; B—10 mm., C—5 mm., D—15 mm., E—30 mm.



Left: The lens magnifier attachment enables the camera lens to be used as a distortion-free screen magnifier for photomicrography, etc. The camera is shown fitted to the microscope attachment Type 2.



Right: The bellows attachment for close-ups and macrophotography giving lens extensions between 35 and 220 mm. A simplified miniature bellows focusing attachment gives lens extensions between 35 and 125mm.

(For conversion into metric units, see page 90)

Lens setting (feet)	Distances focused on (inches) * +1 diopter	+2 diopter	+3 diopter
∞	39⅜	19⅝	13⅛
100	38⅛	19⅛	13
50	37	19⅛	12⅞
25	34½	18⅛	12⅛
15	32⅜	17⅞	12⅛
10	29⅜	16⅞	11⅞
8	27⅞	16⅜	11½
6	25½	15½	11⅛
5	23⅞	14⅞	10⅞
4	21⅜	14	10⅜
3½	20⅜	13⅞	10
3	18⅞	12⅞	9

*Measured from supplementary lens.

It should be noted that *no change in exposure time is required when working with these close-up lenses.* To obtain perfect definition, it is advisable to *stop down.*

The depth of field, when working at such close range, is obviously a very small one. One can count on an approximate *total* depth of:

6 in. with +1 diopter lens, at *f*6.3 and infinity setting;
2 in. with +1 diopter lens, at *f*6.3 and 3½ ft. setting;
2 in. with +2 diopter lens, at *f*6.3 and infinity setting;
1 in. with +2 diopter lens, at *f*6.3 and 3½ ft. setting;
1½ in. with +3 diopter lens, at *f*6.3 and infinity setting;
¾ in. with +3 diopter lens, at *f*6.3 and 3½ ft. setting.

Extension Tubes

Instead of supplementary lenses for close-up focusing, extension tubes can be fitted between the lens and camera body. They can be had in different lengths to increase the extension of the lens of the Exakta at will. Their purpose is

similar to that of the supplementary lenses, but the working distances are rather less. They allow photographs up to natural size, and even larger-than-life size, to be taken straight on to the film (see table below).

A set of tubes consists of a number of sections of various lengths which are fitted together to provide the required extension. There is a back section with bayonet fitting to fit to the camera, and a front section with bayonet fitting to take the lens. These screw together to give an extension of 10 mm. (b). To lengthen the tube, intermediate rings are screwed between them. There are three—5 mm. (c), 15 mm. (d), and 30 mm. (e). In addition and sold as a separate item, there is a two-in-one adaptor ring of 5 mm. length and with bayonet fittings at each end (a). This is used alone to give 5 mm. extension; or it may be used with the set of tubes.

The Exa I is suitable for use with extension tubes from 20–50 mm. without cutting off any of the picture area. Longer extensions, however, produce a noticeably reduced picture field.

CLOSE-UP FOCUSING TABLE FOR EXTENSION TUBES
*2 in. (5 cm.) LENSES **

(For conversion into metric units, see page 90)

Tubes	Extension (mm.)	Focused on (in.)	Subject area (in.)	Scale of reproduction (magnification)	Exposure factor
a	5	21¾	9¼×14	0·1	1·2
b	10	11¾	4¾×7	0·2	1·4
b+c	15	8¼	3⅜×4¾	0·3	1·7
a+b+c	20	6⅛	2⅝×3¾	0·4	2
b+d	25	6	1⅝×2⅜	0·5	2·3
a+b+d	30	5⅛	1⅜×2⅛	0·6	2·6
a+b+c+d	35	4⅜	1⅛×2	0·7	2·9
b+e	40	4⅛	1⅛×1⅞	0·8	3·2
a+b+e	45	4⅛	1×1⅝	0·9	3·6
a+b+c+e	50	4	1⅛×1⅞	1·0	4
b+d+e	55	3⅞	⅞×1⅞	1·1	4·4
b+c+d+e	60	3⅝	1⅛×1⅞	1·2	4·8

*Note that the values for 2¼ in. (5.8 cm.) lenses are rather different.

FLASH WITH THE EXAKTA

Flash is an efficient light source where no or insufficient daylight is available, such as at night, indoors, etc. In the flash you carry your own private "sun" with which you can illuminate your subject or scene at any time or place.

The flash bulb is similar to a small electric bulb. However, when the current passes through it, it lights up in an intense flash lasting about 1/50 sec. Each bulb will flash only once and has to be discarded afterwards.

The flash bulb is inserted in a flash gun, the current of the battery is used to set off the bulb, while a reflecter behind the bulb directs most of the light towards the subject. The light is strong enough to allow a medium or small aperture to be used for the exposure; the shutter speed—provided it is not faster than 1/50 sec.—has no effect on exposure since the flash is shorter than the exposure time, but since focal plane shutters do not free the whole negative area simultaneously —see instructions below.

Electronic flash is produced by an electric discharge in a suitable flash tube. Unlike flash bulbs, these tubes will yield thousands of flashes with power supplied from the mains or various types of battery or accumulator.

How to Use Flash

All Exakta cameras are internally synchronized for flash. A flash socket is fitted on the camera front. An electric cable is connected from the battery case (with flash bulb and reflector) to the flash socket by means of a special two-pin plug (the 1956 VX takes a concentric plug). On release, the shutter automatically closed the firing circuit through the flash contact and sets off the bulb, so that the peak light of the bulb coincides with the instant that the shutter is fully open.

Exakta II, V and VX models have two sets of flash contacts, one marked M (formerly V) for flash bulbs and one marked X (formerly E) for electronic flash. With the X setting, electronic flash can be used with the shutter speed of 1/50 sec. With the M setting, focal-plane flash bulbs may be used (e.g., Philips P.F.24 or P.F.45) with shutter speeds between 1/100 and 1/1000 sec.

The Exakta Varex IIa, IIb and VX1000 also have a third flash socket, marked F, for use with small bulbs (P.F.1, P.F.5, etc.) at a shutter speed of 1/30 (1/25) sec. (The letters M and F do *not* signify class M or F flash bulbs.)

Ordinary "M" class flash bulbs may be used with the "X" contact if the Exakta shutter is set to 1/5 sec.; the short flash duration of the bulb will still produce an instantaneous shot.

Cameras with one flash contact are unsuitable for electronic flash —except RTL1000, see below. A reliable workshop can, however, install an "X" contact into these cameras. While the single flash contact cameras have been designed for "M" synchronization (see above), it is advisable to make practical tests with focal-plane bulbs to establish the correct working, as variations have been found in these older cameras.

The Exakta RTL1000 shutter has one flash contact on the side wall of the body (X) which is suitable for use with electronic flash at 1/125 sec. and with flash bulbs at 1/30 sec.

Exa cameras have the flash synchronization setting marked on the camera top plate, opposite the shutter speed disc. For electronic flash, set the flash symbol opposite the dot between 1/30 and 1/60 shutter speed. For bulbs, set the bulb sign opposite the dot.

When working with flash, it is essential to transport the film *before* the flash attachment is connected (or the bulb inserted).

Blue-tinted flash bulbs are suitable for colour-reversal, colour negative and black-and-white films. Clear bulbs, originally intended for black-and-white only are now discontinued.

FLASH EXPOSURES

With X-synchronization and shutter set at "B" or 1/5 sec.

Distance	G.E., G.E.C., Mazda: No. 1 Philips: PF 1 AG 1	G.E., G.E.C., Mazda: No. 5 Philips: PF 5	Philips: PF 60
6 ft. (2 m.)	f16	—	—
9 ft. (3 m.)	f11	f22	—
12 ft. (4 m.)	f8	f16	f22
18 ft. (6 m.)	f5.6	f11	f16
25 ft. (8 m.)	f4	f8	f11
35 ft. (12 m.)	f2.8	f5.6	f8

With M-synchronization and Philips PF 6B bulb on Exakta

Shutter Speed	6 ft. (2 m.)	9 ft. (3 m.)	12 ft. (4 m.)	18 ft. (6 m.)	25 ft. (8 m.)	35 ft. (12 m.)
1/100	f4	f10	f8	f5.6	f3.5	f2.2
1/250	f10	f6.5	f5	f3.5	f2.2	f1.8
1/500	f6.5	f4	f3	f2		

The above exposures apply to rooms of average brightness and 30–32° BS (80–125 ASA) films. In small bright rooms, use one stop smaller; or in large darker rooms, one stop larger. Outdoors at night, increase the aperture by two stops.

EXAKTA ACCESSORIES

• FINDER HOOD EXTENSION. This is a collapsible leather box which can be pushed over the reflex hood of the 35 mm. Exakta. It cuts out stray light, increases the brilliance of the reflex image and makes focusing easier.

EXAKTA LENS HOOD. To protect one's lens against stray light from objects outside the picture area, particularly when photographing against the light, a lens hood has to be used. This is a metal tube placed over the front of the lens. *There is no picture which could not be improved in clarity and brilliance by the use of a lens hood.* Various lens hoods are available for the different Exakta lenses. The Exakta lens hoods are slightly conical shaped tubes which are pushed on to the lens mount.

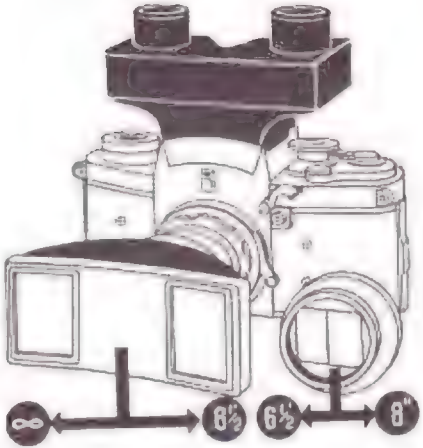
EXAKTA BUTTON RELEASE. A convex metal button can be screwed into the release knob, increasing its surface. It facilitates releasing the shutter while wearing gloves.

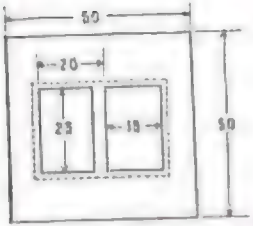
CABLE RELEASE. A cable release is supplied for the Exakta which screws into the screw thread in the centre of the release button.

MICROSCOPE ATTACHMENTS. The micro attachments (page 88) of the Exakta consist simply of a metal tube which can be fitted to the microscope around the draw-tube holding the eyepiece; hinged to this (Type 1) is a second tube which fastens to the camera. After connecting the Exakta by means of the hinged tubes to the microscope, the camera is swung to one side. The microscope can now be used in the usual way, set and focused. Now the Exakta is swung back into the taking position. The ground-glass screen image of the Exakta shows the picture and its definition as it will appear on the negative. Type 2 is not hinged, but has a rapid exchange mount. Adjustments which may be found necessary, both as regards picture framing and focusing, can be corrected by observation through the reflex image. Particu-

EXAKTA STEREO ATTACHMENT

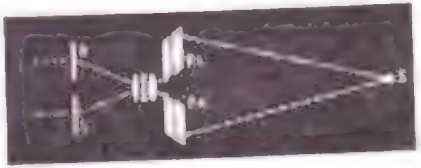
Right: For stereoscopic photography, two attachments are available for use with the standard 2 in. (5 cm.) lens. One has a 65 mm. base and is for distances infinity–6½ ft. The other has a 12 mm. base and covers the range 6½ ft.–8 in. The stereo effect can be observed on the screen by means of a stereo viewer, which is also used to view the finished slides





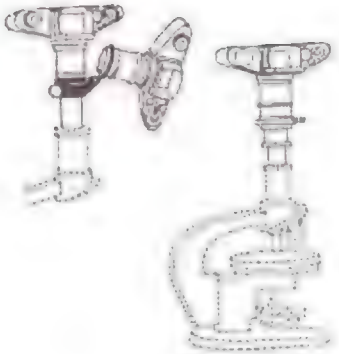
Above: The dimensions (in mm.) of a stereo slide mounted for projection. The mount is a standard 2×2 in. (50×50 mm.) as used for 24×36 mm. transparencies.

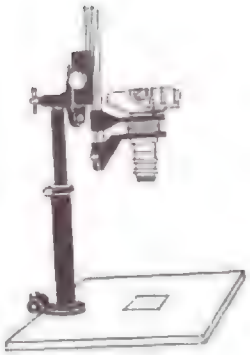
Below: The stereo attachment consists of two prisms, P.L. and P.R., which enable the camera lens to "see" the subject from two viewpoints and produce two images side by side on the film —R the right-eye image and L the left-eye image.



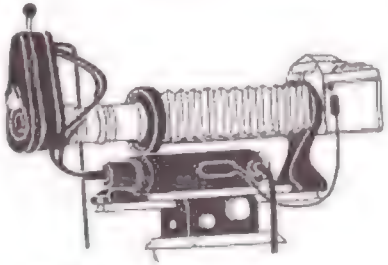
FURTHER EXAKTA ACCESSORIES

Right: Microscope attachments Type 1, with a hinged clamp, and Type 2, with a rapid exchange mount. The camera is used without lens, the microscope objective forming the image.





Below: The Kalpolat electronic flash attachment for close-up, clinical and medical photography. It includes the bellows attachment, a special 5½ in. (13.5 cm.) f4 lens, and flash head with a flash tube around the lens mount.



Above: The complete bellows attachment—i.e. focusing slide and bellows extension—may be used on a tripod or similar support. Here it is set up on the multipurpose stand for copying

larly when taking living objects, following up the object on the reflex image by moving the mechanical stage of the microscope or the slide may prove invaluable. The degree of enlargement is determined by objective and eyepiece.

FOCUSING SLIDE. This is to facilitate focusing for close-ups and macrophotography. The slide is screwed to a tripod or copying stand and the camera attached to a bracket clamped to the slide. A control knob moves the slide, and therefore the camera, to and fro.

BELLOWS ATTACHMENT. This is used with the focusing slide and gives 3.5 to 22 cm. lens extension for close-ups and macrophotography.

• PRISM ATTACHMENT FOR EXAKTA I and II. This is pushed over the opened finder hood, and allows the camera to be used at eye level. The full reflex image is visible, right way up and right way round. The image in the finder therefore moves in the same direction as the object. This is particularly valuable in following moving subjects in the viewfinder. The prism attachment carries an additional magnifier.

A similar attachment is available for the Exakta V and VX, where it is interchangeable with the regular reflex finder (pages 18-21).

A range of specialised attachments have been produced for the Exakta, such as a *multipurpose stand* for macrophotography, duplicating transparencies and photomicrography; and adapters for medical instruments—cystoscope, endoscope, gastroscope, ophthalmoscope, the Koloscope for photographing cavities of the human and animal body. The description of these instruments has been omitted here as being beyond the scope of this booklet.

CONVERSION OF FEET AND INCHES INTO METRIC UNITS

Many cameras are marked only in either the metric or British system, while most of the tables in this book are also given in only one system. The following table shows at a glance equivalent lengths.

British to Metric		*Metric to British*	
⅛ in.	0.32 cm.	0.5 cm.	3/16 in.
¼ in.	0.64 cm.	1 cm.	⅜ in.
½ in.	1.27 cm.	2 cm.	¾ in.
1 in.	2.54 cm.	3 cm.	1 3/16 in.
2 in.	5.08 cm.	4 cm.	1 9/16 in.
3 in.	7.62 cm.	5 cm.	1 15/16 in.
4 in.	10.2 cm.	6 cm.	2⅜ in.
5 in.	12.7 cm.	7 cm.	2¾ in.
6 in.	15.2 cm.	8 cm.	3⅛ in.
7 in.	17.8 cm.	9 cm.	3½ in.
8 in.	20.3 cm.	10 cm.	3 15/16 in.
9 in.	22.9 cm.	12 cm.	4¾ in.
10 in.	25.4 cm.	15 cm.	5⅞ in.
11 in.	27.9 cm.	20 cm.	7⅞ in.
1 ft.	30.5 cm.	25 cm.	9 13/16 in.
2 ft.	61.0 cm.	30 cm.	11⅞ in.
3 ft.	91.4 cm.	40 cm.	15¾ in.
4 ft.	1.22 m.	50 cm.	19¾ in.
5 ft.	1.52 m.	60 cm.	23⅝ in.
6 ft.	1.83 m.	80 cm.	31½ in.
7 ft.	2.13 m.	100 cm.	39⅜ in.
8 ft.	2.44 m.	1.5 m.	4 ft. 11 in.
9 ft.	2.74 m.	2 m.	6 ft. 7 in.
10 ft.	3.05 m.	2.5 m.	8 ft. 3 in.
15 ft.	4.57 m.	3 m.	9 ft. 10 in.
20 ft.	6.10 m.	4 m.	13 ft. 2 in.
30 ft.	9.14 m.	5 m.	16 ft. 5 in.
40 ft.	12.20 m.	10 m.	32 ft. 9 in.
50 ft.	15.24 m.	15 m.	49 ft. 2 in.
100 ft.	30.48 m.	20 m.	65 ft. 7 in.

SHUTTER SPEEDS TO ARREST MOVEMENT

Subject	Speed in m.p.h.
Swimmer ...	2½
Walker ...	3
Runner ...	12½
Cyclist ...	15
Skater ...	28
Horse walking	4
,, trotting	9
,, galloping	19
Racehorse ...	31
Waves ...	15
Heavy waves	44
Boats making 10 knots ...	11½
Boats making 20 knots ...	23
Tramcar ...	20
Motor car on open road...	35–80
Slow train ...	25
Express train	60
Aeroplane ...	95–700

With Normal Focal Length Lens	Distance Between Camera and Object					
	3 m.	5 m.	7.5 m.	12.5 m.	25 m.	50 m.
	10 ft.	17 ft.	25 ft.	42 ft.	83 ft.	165 ft.
Speed m.p.h.	Shutter Speeds in Fractions of Seconds					
0—1	1/50	1/20	1/16	1/12	2/5	1/2
2	1/60	1/30	1/25	1/15	1/8	1/3
3	1/100	1/60	1/40	1/25	1/12	1/6
4	1/125	1/75	1/50	1/30	1/15	1/8
6	1/200	1/100	1/75	1/50	1/25	1/10
8	1/250	1/150	1/100	1/60	1/30	1/15
10	1/300	1/200	1/125	1/75	1/60	1/30
20	1/600	1/400	1/250	1/150	1/75	1/40
30	1/1000	1/600	1/400	1/250	1/125	1/60
40		1/750	1/500	1/300	1/150	1/75
60			1/750	1/500	1/250	1/100
80			1/1000	1/600	1/300	1/150
100				1/750	1/400	1/200

The values given are for PERPENDICULAR displacement to the optical axis.
MOTION 45° to optical axis increase time by 50 per cent.
MOTION parallel to optical axis increase time 300 per cent.

With a wide-angle lens of two-thirds of the normal focal length the exposure time can be one-third longer than indicated above, while with a lens twice the normal focal length only half the exposure time is permissible and with three times the normal focal length only one-third of the time listed above for normal focal length lenses should be used.

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The Focalguide to Cameras Clyde Reynolds

Clyde advises each reader on which camera he needs. He cuts through technical jargon, sales flannel, gadget gimmickry and price snobbery and concentrates on selecting the right camera for the job, how cameras work, and how to use them. It is written for camera-buyers, owners, designers and salesmen.

The Focalguide to 35mm Leonard Gaunt

A concise introduction to photography with 35mm cameras of any kind, including cartridge loading cameras. It shows the advantages and disadvantages of each type and of its accessories, advises the beginner on choice of camera and how to get the most from it.

The Focalguide to the 35mm Single Lens Reflex Leonard Gaunt

This book tells exactly how the single lens reflex camera and its accessories work for all users, students, amateurs and professionals—how to choose it, use it and get the best results out of it, make the most of its advantages and overcome its few disadvantages.

The Focalguide to Lenses Leonard Gaunt

A compact guide to all lenses used in photography—the earliest to the most modern. It studies their history and design while keeping a wary eye open for gimmicks, examines the validity of claims made for new lenses, and probes the theory behind lens design and performance.

The Focalguide to Filters Clyde Reynolds

A guide to all types of filter in photography, the materials they are made of and the way they work, which assumes the reader has no prior knowledge of the subject. It tells him exactly which filter is needed for each job and is the first such book to put its main emphasis on colour.

The Focalguide to Colour David Lynch

Colour is everywhere. Colour is easy. Colour isn't expensive. Here is advice about achieving good colour photos even if they are the first the photographer has ever taken. It forms a bridge between successful snapshots and successful pictures.

The Focalguide to Effects and Tricks Günter Spitzing

Magic is no mystery—just another man's skill. This survey of photography which brings about fantastic changes in the subject, explains what you can achieve while *taking* the picture—that is at the exposure stage. It teaches you how to have fun and bend the rules with your camera.

The Focalguide to Low Light Photography Paul Petzold

Photography by 'existing light', however dull, indoors and out, in colour or black-and-white is the subject. Whether you find your picture under a street light at night, in a smokey pub or a flood-lit sports stadium, you can learn to make the most of the opportunities it offers.

The Focalguide to Flash Günter Spitzing

Bad light does not stand in the way of good results when you have 'flash' know-how at your fingertips. Camera users will welcome this exhaustive treatment of flash photography. After a thorough course in fundamentals it studies applications and techniques; the simplest to the most sophisticated.

The Focalguide to Lighting Paul Petzold

Get good photos from the start by mastering the use of artificial light when taking pictures. Flash, photo and domestic lamps are valuable aids to success. Special attention is paid to the perennial problems of high contrast lighting conditions and of combining day and artificial light.

The Focalguide to Home Processing R. E. Jacobson

Why wait to see the results when you can process your films within an hour of removing them from the camera, and you can save money? Find out how simple and inexpensive it is for both colour and black-and-white photography. You don't need a darkroom either.

The Focalguide to Enlarging Günter Spitzing

Here are the techniques used for enlarging graphic effects in colour and black-and-white photography. It is fun to do, you can control exactly what you enlarge—just a small section of the photo if you want—and it takes less money, time and trouble than you might think.

FOCAL CAMERA GUIDES

Asahi Pentax Guide
Canon Reflex Guide
Exa Exakata 35 mm. Guide
Hasselblad Guide
Konica Reflex Guide
Konica 35mm. Compact Guide
Leica Guide
Leicaflex Guide
Mamiya Sekor Guide
Minolta SLR Guide
Minox Guide
Nikkormat Guide
Nikon F Guide
Olympus OM-1 Guide
Olympus 35 mm./Compact Guide
Praktica and Prakticamat Guide
Retinette Guide
Rolleiflex Guide
Rollei 35 mm. Guide
Yashica Twin Lens Reflex Guide
Yashica 35 mm. Guide
Zenith Guide

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